ELECTRICAL REVIEW

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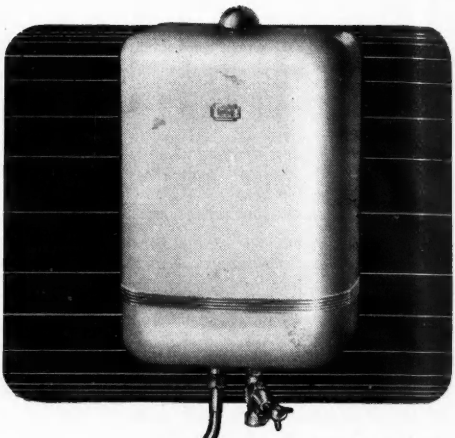
In a month and a day—

THE B.I.F., which has a disconcerting habit of stealing up unobserved, will open its doors on May 8th. By then our stand (we trust) will be completed and all our exhibits (we fervently hope) will be in position. Among them we are showing the New Look Waterheater which is —(and this we definitely *know*)— the most outstanding 11½ gallon storage heater on the market.



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ELECTRICAL REVIEW

Vol. CXLVI No. 3776 7TH APRIL, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Electrical Exporters

CONFUTATION OF SOME FALSE VIEWS

WE publish a letter in this issue reflecting upon British manufacturers' export methods. It is a fair example of the ill-informed criticism which is bandied about both at home and overseas and we can say at once that so far as electrical manufacturers are concerned it is badly directed.

Our correspondent suggests, in the first place, that British electrical manufacturers are losing ground, but he is evidently unaware of the tremendous expansion in British electrical export trade. Already in 1938 Great Britain was the world's greatest electrical exporter, but the total trade in that year (£23 million) seems insignificant compared with the £126 million for 1949, even when allowance is made for altered values. Nor can this be entirely attributable to the post-war sellers' market.

Different Standards

He puts the entire blame for lack of standardization between the "Old World and the New" upon this country, implying that we should have adopted American standards. The fact is that British standards came first but the strong American influence both north and south of the United States led to the adoption of American practice in those territories. British exporters were mainly concerned with the Commonwealth countries and thus two distinct "spheres of influence" evolved. It was not until the close Anglo-American wartime association grew up that the differences in standards became so evident, mainly in military matters.

Nevertheless, British manufacturers are doing a great deal to overcome these differences and to meet the requirements of individual markets. They do expect, however, that their customers will not insist on entirely new designs when existing products are satisfactory. If they go to the length of producing equipment for a specific market they must be assured that it will not be excluded by import licensing regulations, leaving them with goods which cannot be sold elsewhere.

Improved Deliveries

Complaint is made of prolonged delivery periods. This was a natural consequence of the rush of orders after the war and was experienced by all producers—British and foreign. But it is no longer true that British electrical manufacturers cannot execute orders in a reasonable time. Once again they are willing to undertake contractual obligations involving penalties for delay.

Another contention is that comprehensive priced catalogues are not available. There was little chance of producing such a catalogue immediately after the war, but now any substantial prospective overseas buyer can obtain the B.E.A.M.A. catalogue which is an excellent conspectus of the products of most of the leading British electrical manufacturers. It is a little unreasonable of our correspondent

to expect catalogues to give firm prices in the face of the world's currency situation, rising labour costs and fluctuations in the prices of commodities and services. Manufacturers are forced to quote for a particular order at a given time and this, again, certainly not a peculiarly British practice.

The letter concludes by saying that there is little evidence of market study by British manufacturers. The truth is that never was so much time and care devoted to this subject by associations and individual firms as at present, and there has been plenty of evidence of tangible results. We are convinced that if our correspondent (and others who feel as he does) establishes contact with likely suppliers of his needs, instead of relying on out-of-date reports, he will revise his views as to the British electrical industry's attitude and capabilities.

DISTRIBUTION "CUT"

For what we believe to be the first time, actual figures have been given of the anticipated "cut" in expenditure upon electricity distribution. They are in the "Economic Survey, 1950" published last week from which it seems that the reduction is from £40 million in 1949 to £35 million this year, or something over 14 per cent. The undesirability of this move is recognized in the Survey, which says: "The check to expenditure on distribution in 1950 represents a drastic slowing down in the programme, necessitated by the Government's decision that investment programmes should be reduced. There is a large amount of work which will have to be carried out as soon as circumstances permit, in order to prevent deterioration of the service."

BUT NOT GAS

In the next paragraph of the Survey it is shown that expenditure upon extensions and renewals in the gas industry is to rise from £24 million in 1949 to £26 million this year "to overtake arrears of maintenance and to meet steadily increasing demand." This demand is growing merely because electrical expansion is being officially discouraged. As Mr. E. R. Wilkinson said at the Electrical Housecraft Advisers' dinner last week, the gas industry was disposing of three or four times as many cookers as the electrical industry in spite of the fact that a large majority of occupants of new houses had expressed a preference for electricity. Mr. Wilkinson has our strong support in his exhortation to the electrical housecraft advisers to make the advocacy of electric cooking their main job. The cookers are there and people want them; it is only official discouragement (generally veiled) which acts as a deterrent.

THE M.K.S. UNITS

There was remarkable unanimity, as will be evident from the discussion summarized on another page, among those who argued the case for the adoption of the metre-kilogramme-second system of units in this country at the I.E.E. last week—and they were not all teachers. The reform should not mean an upheaval; it has more to do with the algebraic form of equations than units, so the change advocated would be æsthetic in the sense that one likes equations to be tidy. Most concerned are the teachers, but the efforts of the increasing number who are teaching the M.K.S. system will be worse than useless if examiners persist in the employment of the present mixed systems, which involve the use of all kinds of conversion factors and will become cumulatively troublesome. Reform of the ungainly is not merely a change of fashion but in this case will mean simplification in the long run.

ELECTRIC EELS

Because it breathes air and thus will live out of water for some time, *electrophorus electricus* (eel) is very suitable for the study of "animal" electricity. About 0.5 A at up to 300 V can be drawn from an adult specimen (1 A short circuit and 600 V open circuit peaks) in 0.003 sec pulses. Moderate stimulation will produce 500 discharges a minute, but frequently more than 100 discharges per second have been observed. A professor of physics who is studying the subject in America suggests that if a chemical model could be made of the series-parallel tissue array of the eel, it might be commercially worth while.

Feed-Water Heating

Unusual Installation at Lancaster Mills

WE believe the Marguerre system of boiler feed-water heating which has been adopted in the recently commissioned electricity and process-steam power station at the Lune Mills, Lancaster, of Jas. Williamson & Son, Ltd., to represent the first installation of its kind to be established in this country, at any rate in an electricity generating station.

The purpose of the system in this particular installation is to level the out-of-balance demands for process heating, in the form of low-pressure steam from back-pressure turbines, and for electricity, conditions which are peculiar to the large-scale production of linoleum, leather-cloth and hard surface floor coverings.

The electricity and process-steam demands are far from concurrent, the former being mainly a day-time load, while the greater use of steam occurs at night. The high-load electricity period is from about 8 a.m. to 5 p.m., with a considerable lunch-time valley, while the steam peak period is from about 5 p.m. to 9 p.m., from which time the demand is gradually reduced throughout the night to its lowest point at from 6 a.m. to 7 a.m.

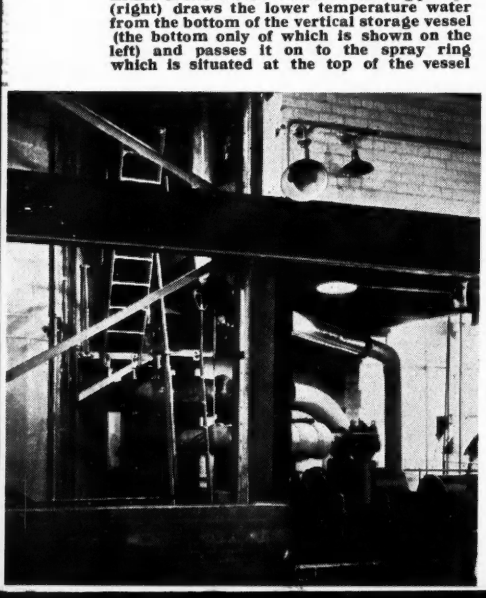
To meet these out-of-balance conditions in the most efficient way the following steam and electricity generating plant has been installed for operation in con-

A thermal storage boiler feed-water preheating system has been installed at the new Lune Mills power station. The essential feature of the installation is the large cylindrical hot-water storage vessel mounted in the steel girder structure of the station buildings (*see above*)

Make-up water is pumped into the heat storage vessel by either of two motor-driven lift pumps: the steam receiver is seen at rear

junction with the Marguerre heat storage feed-water heating system. There are four Mitchell Engineering 40,000 lb/hr boilers for steaming conditions of 650 lb/sq in and 750 deg F when the feed-water temperature is 325 deg F. These boilers serve directly two Belliss Morcom — Lancashire Dynamo & Crypto 3,000 kW back-pressure turbo-alternator sets, this rating applying when the exhaust is at 60 lb/sq in. At an alternative back pressure of 120 lb/sq in the rating is 2,000 kW. There are also two 500 kW condensing turbo-alternators of the same make which operate on the exhaust steam from the back-pressure turbines during electrical high load periods. Full load steam flow to one condensing set, after being exhausted from a back-pressure set, increases the output of the latter by 400 kW.

The high thermal efficiency of about 65 per cent achieved by the station as a whole will result in an annual coal saving of about 20,000 tons on the earlier method of operation with process steam direct from Lancashire boilers and electricity from public supply. Another interesting point is the saving in boiler plant capacity of 20,000 lb/hr, i.e., half the capacity of one of the new boilers, as the result of the heat-storage feed-water heating installation. The out-of-balance levelling in the steam and electricity demands is, of course, the direct result of the injection of heat from the back-pressure turbine exhausts into the feed-water storage system during the daytime, and the use of the greater part of the stored heat during the evening so that the daytime transfer of heat to storage takes place when the back-pressure turbines can be used to their full purpose electrically, i.e., when the electrical demand exceeds the process-steam demand in relation to the general plant capacities. It is intended in a future article fully to describe the new power station as a whole, and we have, therefore, in the present article, refrained from making reference to the station, except, so far as is necessary for an understanding of the purpose and operation of the heat-storage feed-heating system.



Either of two motor-driven circulating pumps (right) draws the lower temperature water from the bottom of the vertical storage vessel (the bottom only of which is shown on the left) and passes it on to the spray ring which is situated at the top of the vessel

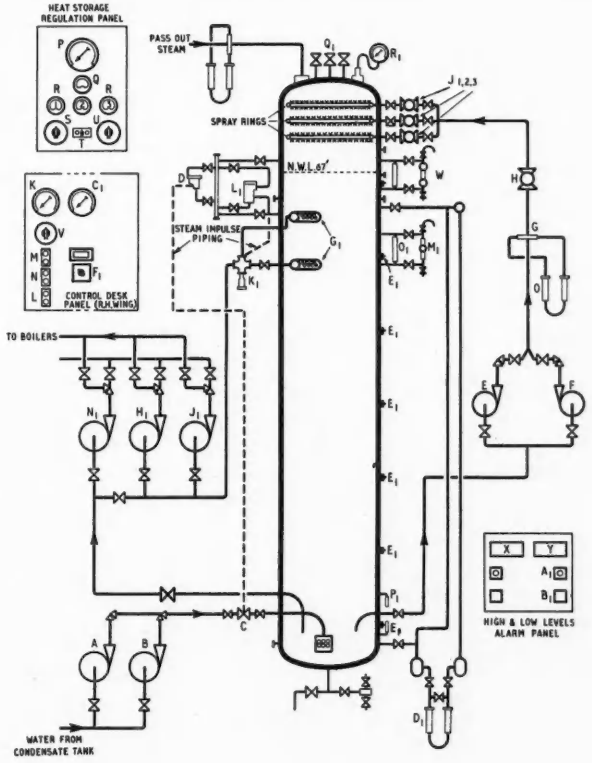
The essential feature of the feed-heating installation is the large cylindrical hot-water storage vessel having a capacity of 70 million B.Th.U. which was constructed by G. A. Harvey & Co (London), Ltd., to the order of Ruths Accumulators (Cochran), Ltd. Measuring 77ft long and 12ft in diameter, and weighing 70 tons when empty, it is vertically disposed in a steel girder structure which is an integral part of the power station build-

ings. Made of one-inch steel plate throughout, the seams of the shell are fusion welded and they have been stress relieved and subjected to X-ray examination. The vessel is heat insulated with 3.5in of glass wool covered by a layer of hard-setting cement.

In contrast to the Ruths accumulator system in which steam is released from the stored hot water when the pressure is reduced, in this case the hot water is taken direct from the vessel for use as feed water at the constant feed-water temperature of 345 deg F.

The operation of the thermal-storage installation is described by reference to the accompanying diagram. The normal water level in the vessel is 67ft from the bottom, and the remaining space, representing 10ft from the top of the vessel, is utilized for the mixing of steam and water, i.e., the initial stages of the transfer of heat from the pass-out steam to the boiler feed water. Usually at the lowest heat - storage capacity of the vessel, i.e., at the beginning of the day, the 67ft column of water is almost entirely at 190 deg F. At this lower temperature, make - up water from the station condensate tank, via a filter and a de-aerator, is pumped into the heat storage vessel at a point near the bottom of the vessel by either of two motor - driven lift pumps A and B. The station condensate tank is served mainly with condensate both from the factory and from the condensing turbo-alternators. The water enters the vessel via an automatic feed-water regulating valve C, governed by the float regulator D which, as and when necessary, permits steam to operate on the diaphragm of the automatic regulating valve C.

Steam exhausted at 120 lb/sq in from the back-pressure turbines is passed directly into the mixing space at the top of the storage vessel where it is condensed by sprays of water at 190 deg F, issuing from the spray rings, thus increasing the temperature of the condensing water to about the boiler feed-water temperature of 345 deg F, which is a little below the saturation temperature corresponding to the steam pressure in the vessel. The heat absorbed in raising the temperature of the water represents the heat storage value for any given time.

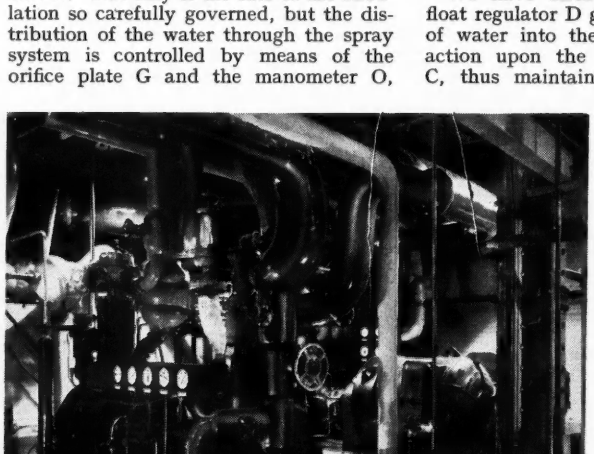


The operation of the thermal storage installation is described by reference to the diagram on the right

The water sprays and the rings from which they operate are all part of a system for circulating the water in the tank as a means of overcoming the difficulties consequent on the poor heat-conducting qualities of water. Either of the motor-driven circulating-wäter pumps E and F draws the lower-temperature water from the bottom of the storage vessel and passes it on to the spray rings, first via orifice plate G in the pipe-line, then through a regulating valve H, and finally through the three spray control valves J.

The rate of circulation of the water governs the quantity of steam taken into the heat storage vessel from the back-pressure turbines and is determined by the control engineer, who is able to keep the flow of steam to the vessel under observation by means of a steam-flow meter K on the control desk in the station main control room. With this steam quantity in mind the control engineer can then decide to what degree the motor-control valve H should be opened or closed, and he makes the necessary valve operations by means of the push buttons L on the control desk. The circulating pumps are also manually operated from the control desk by the push buttons M and N. Not only is the rate of the circulation so carefully governed, but the distribution of the water through the spray system is controlled by means of the orifice plate G and the manometer O, which is electrically connected with the heat-storage regulation panel and the spray control valves J, so that the number of spray rings working is suited to the rate of circulation, and ensures that the spray water is finely atomized even at low rates of circulation. There is provision also for the manual operation of the spray control valves. All this is done by and/or in conjunction with the circulating water flow indicator P, the position indicator Q for the control valve H, the position indicators R for the spray valves J, the switch S for the automatic operation of the selected spray valve by the button unit T, and the selector switch U for manual valve operation. Associated with the steam-flow meter K is a "Variac" transformer by means of which compensation is provided for variations of the steam pressure and temperature via the control V. As the water from the sprays, with the condensed steam, falls on to the water column in the tank, the 345 deg F section of water at the top increases in depth and the 190 deg F column at the bottom decreases until the vessel is completely full of the higher temperature water and thus attains its full storage capacity.

We have already explained that the float regulator D governs the rate of flow of water into the storage vessel by its action upon the inlet regulating valve C, thus maintaining the normal water level of 67ft. At levels of 67ft 9in and 66ft 3in there are, however, high- and low-water float switches W which operate high- and low-water alarms X and Y on a distant alarm panel, and associated with these alarms are warning lamps A1 and alarm cut-out switches B1.



The normal draw-off from the storage vessel is by means of either of two motor-driven boiler feed pumps (right), while an emergency draw-off is served by the steam turbine-driven boiler feed pump (left)

For indicating on the meter C1 the amount of heat stored in the vessel at any time a flow-meter type of manometer D1 balances the weight of water in the vessel against the weight of a column of water at constant temperature outside the vessel. The principle, of course, is the variation of the density of water with the temperature, and the measuring instrument is so scaled that, with water at 190 deg F throughout the vessel, the stored heat is shown as zero, while at 345 deg F throughout the vessel the storage indication is 100 per cent. An additional check on the heat level is afforded by seven thermometers E1 placed at regular intervals along the vessel, all of which are electrically connected to the multipoint indicator F1 on the control desk.

As the term "feed water" in so many power stations implies boiler feed water, it may be well at this stage to emphasize the distinction in this article between the storage-vessel feed water and the boiler feed water. So far we have dealt almost entirely with the former, but now we come to the stage at which stored-heat water leaves the storage vessel as feed water for the boilers.

There are two boiler feed-water draw-off points G1 near the storage vessel top water level, one at about 65ft and another at about 55ft. Normally the water is drawn from the higher of these by one of the motor-driven boiler feed pumps H1 and J1. In the event of a fall in the level of the water in the storage vessel, however, the draw-off will automatically change over from the higher to the lower point. This is effected by means of a change-over valve K1 which is operated by a float regulator L1, similar to the float regulator D. A further emergency boiler feed-water supply precaution is provided by the float switch M1 which, with a further fall in the water level, will change over from the motor-driven boiler feed pump to the steam-turbine driven boiler feed pump N1 which draws water from the bottom of the vessel. Under normal operation the feed pumps pass the water on to the boiler economizer at 345 deg F and 800 lb/sq in. The heat storage vessel mountings also include water level gauges O1 and P1, safety valves Q1 and a pressure gauge R1.

The control gear for this installation was supplied by Electroflo Meters, Ltd., and Ronald Trist, Ltd.

As consulting engineers for the installation described, Kennedy and Donkin collaborated with Mr. G. K. Alston, chief engineer of Jas. Williamson & Son, Ltd., to whom we are indebted for permission to view the plant and to publish this description. We are also indebted to Mr. Alston for his help in obtaining the necessary information and photographs.

Aircraft Electrical Installations

At a meeting of the Association of Supervising Electrical Engineers in London last week Mr. A. N. Irens and Mr. M. J. Crouin, both of the Bristol Aeroplane Co., Ltd., delivered a lecture on the electrical installations and equipment in large modern aircraft such as the 130-ton Bristol *Brabazon* and the 140-ton Saunders-Roe *Princess* flying boat. Although the speakers dealt primarily with the power supplies and controls in these typical large installations, they covered a number of other aircraft systems fundamentally similar in principle.

The authors began by emphasizing the inherently arduous conditions under which aircraft equipment has to work and outlined some of the techniques and specialized equipments which have been developed to overcome the diverse problems which occur. They then proceeded to describe the various forms of electric actuators which are now being widely used in nearly all modern aircraft for applying linear and rotary movements to mechanisms of one form or another, and passed on to discuss the relative merits and features of design of the different types of motors and generators in common use, referring briefly to methods of excitation and voltage regulation. The 112 V d.c. generator system was not treated in detail as it is considered to have a specialized application. In the authors' opinion the 200 V 400 c/s system, with a small percentage rectified to 28 V d.c., is very flexible and could meet the requirements of most large aircraft.

After dealing with distribution, wiring, switchgear and protective arrangements, the speakers described the mode of operation of propeller controlling equipment and the power-operated controls, which are essential in large aircraft, concluding with a reference to remotely indicating instruments and associated devices.

PARLIAMENTARY NEWS

By Our Special Reporter

DURING the debate in the House of Commons on coal and oil supplies on 29th March Mr. R. S. Hudson, in calling attention to dirty coal, said that not only did the housewife complain but the railways and electricity companies were complaining. Only last week he was told that, on the average, supplies of coal coming by rail and sea to electricity generating stations in London often contained as much as 25 per cent of stone and dirt compared with a maximum of 14 per cent before the war.

Mr. Noel-Baker, Minister of Fuel and Power, replied that he had taken the matter up with the National Coal Board and asked it to regard it as urgent and important. The Board had agreed to do everything it could to ensure that the quality should be immediately improved.

Television or Telephones?

Colonel Gomme-Duncan asked the Postmaster-General what amounts of materials were used in the provision of television services which might otherwise be used for speeding up the provision of telephones.

Mr. Ness Edwards said that many materials were required for the provision of television services; among the principal ones used for extending the B.B.C.'s service to the Midlands were steel 365 tons; lead 176 tons and copper 102 tons. These amounts, which were approximate, represented the combined user by the B.B.C. and the Post Office in providing the transmitting station, the radio communicating link and the cables associated with the link. In addition buildings were provided costing £80,000. It was not possible to say to what use such material might be put if television were not extended.

Telephone Lines

In reply to Mr. John Morrison, Mr. Ness Edwards said that at 31st March, 1946, there were 86,300 telephone exchange lines serving Government Departments and by 31st December, 1949, the number had been reduced to 44,000. In the same period, the number of lines to business premises had increased from 973,000 to 1,379,000, and those to private residences from 1,189,000 to 1,511,000.

Uganda Power Scheme

Answering questions by Mr. J. B. Hynd, Mr. Griffiths, Secretary of State for the Colonies, said that the contract for the erection of a dam and hydro-electric station at Jinja, Uganda, was placed in September, 1949, and preliminary work on the site had now begun. It was too early to give a detailed forecast of industrial development in the Jinja area, but projects for the manufacture of cotton textiles, fertilizers, paper, building materials and iron and steel were among those being considered. A cement factory had been started at Tororo and would eventually draw its power from Jinja.

Sub-Area Reorganization

WITH effect from 1st April the Taunton, Exeter and Torquay Sub-Areas of the South Western Electricity Board have been merged into two organizations centred on Taunton and Exeter, and named respectively the Taunton and Devon Sub-Areas. The existing Bristol and Cornwall Sub-Areas remain unchanged. There is thus a reduction from five to four in the number of Sub-Areas.

This decision to re-group the Sub-Areas has been made possible by the completion of the District organization and consequent transfer to District managers of certain commercial and engineering functions previously carried out by Sub-Areas. This will enable Sub-Area managers to concentrate on their task of supervising and co-ordinating the work of their Districts and guiding the implementation of the Board's policy in their Sub-Areas. The re-grouping represents an important step towards reducing the Board's management costs.

Mr. L. V. Turner continues to be manager of the new Taunton Sub-Area, which includes two Districts taken over from the former Exeter Sub-Area. The remainder of the latter plus the existing Torquay Sub-Area constitute the new Devon Sub-Area under Mr. G. T. Garwood, who remains at the Sub-Area office at Exeter. Mr. C. J. Hollyer, manager of the Torquay Sub-Area since nationalization, is retiring at the end of June after completing forty-four years' service in the electricity supply industry.

The grouping of Districts in the new Sub-Areas is as follows: Taunton: Barnstaple, Bridgwater, Bridport, Crewkerne, Exe Valley (District Office, Tiverton), Minehead and Taunton. Devon: East Devon (District Office, Exeter), Exeter, Plymouth, Torbay, West Devon (District Office, Bideford).

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority has appointed **Mr. F. W. Smith,** C.M.G., M.C., to be a chief officer of the Authority. Mr. Smith, who has been released from his appointment as a deputy secretary by the Ministry of Fuel and Power, will have responsibility for contract negotiations and procedure arising out of the capital plant programme. In performing his duties he will act in close association with the chief engineer (Mr. V. A. Pask).

Mr. J. V. G. Hope has been appointed secretary of Parmiter, Hope & Sugden, Ltd., in succession to **Mr. W. N. Sugden,** who has retired for health reasons.

Mr. S. H. Brewell, M.B.E., chairman and managing director of A. H. Hunt, Ltd., sailed in the *Queen Mary* on 31st March. He is visiting America in connection with existing licence arrangements for the manufacture of metallized paper capacitors in the United States and Canada, under Hunt's patents.

Mr. W. H. Powell has retired from the board of the Westinghouse Brake & Signal Co., Ltd.

Mr. P. Tonks and **Mr. F. W. Norris** have been appointed additional directors of the Revo Electric Co., Ltd.

At the annual meeting of the Batti-Wallahs' Society held on 27th March **Mr. H. Nimmo,** M.I.E.E., M.Inst.C.E., M.I.Mech.E., chairman of the Southern Electricity Board, was elected president for the ensuing year in succession to **Mr. Forbes Jackson,** M.I.E.E. **Mr. A. H. Hughes** was re-elected hon. secretary and treasurer, and **Mr. J. Temple Hazell** continues as assistant hon. secretary and treasurer. It was announced at the meeting that during 1949 over £76 had been collected at the Society's monthly luncheons on behalf of the Electrical Industries Benevolent Association.

Mr. H. Nimmo

Mr. Nimmo, after many years in Burma, was appointed chief engineering inspector to the Electricity Commission in 1929 and after the death of Sir Leonard Pearce in 1947 became an Electricity Commissioner. On the formation of the British Electricity Authority he was at first appointed area liaison officer to the Authority, but subsequently was appointed chairman of the Southern Electricity Board.

As we briefly reported in our last issue, **Mr. J. Innes,** C.B., B.Sc., M.I.E.E., managing director of Cable & Wireless, Ltd., retired from that position on 31st March,

Mr. J. Innes

Maj.-Gen. L. B. Nicholls

and he has been succeeded by **Major-General L. B. Nicholls,** C.B., C.B.E. M.I.E.E.

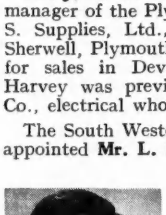
Mr. Innes, whose work in the telecommunications industry is well known, entered the Post Office Engineering Department in 1913 and in his earlier years was engaged on telegraph and telephone engineering in the field. He was responsible for the conversion of the Edinburgh telephone system to automatic operation and in 1929 was adviser to the South African Government on automatic telephone systems. He also visited the United States, Germany and Poland on special missions on communications. Later he became assistant engineer-in-chief and in 1936 was transferred to administration duties as assistant secretary responsible for the administration of the telephone service. He became principal assistant secretary in 1939 and Director of Telecommunications and member of the Post Office Board. During the war he served with the Ministry of Fuel, latterly as controller-general. He was appointed managing director of Cable & Wireless, Ltd., in December, 1948.

Major-General Nicholls has been a direc-

tor of Cable & Wireless, Ltd., since his retirement from the Army in 1947, and has visited the Far East, Israel and the Mediterranean, and the West Indies for the company. During the war he served as chief signal officer successively to Field Marshal Alexander in the Middle East, Field Marshal Wilson and General Eisenhower in North Africa and to Field Marshal Montgomery in Europe. He was the first British officer to become an honorary graduate of the U.S. Signal School, Fort Monmouth, and was made a Commander of the Legion of Merit by President Roosevelt.

Mr. J. G. W. Harvey has been appointed manager of the Plymouth branch of B. and S. Supplies, Ltd., at 22, Camden Street, Sherwell, Plymouth, and will be responsible for sales in Devon and Cornwall. Mr. Harvey was previously with E. Kirke & Co., electrical wholesalers, of Plymouth.

The South Western Electricity Board has appointed **Mr. L. F. Weir,** B.Sc. (Eng.) as Sub-Area engineer, Cornwall Sub-Area, following **Mr. H. R. C. White's** appointment as District manager, West Cornwall. Mr. Weir, who is thirty-five and a native of Portsmouth, served a student apprenticeship with the English Electric Co., Stafford. He held various engineering and commercial posts with the former Cornwall Electric Power Co. and the Isle of Wight Electric Light & Power Co., and in 1949 was appointed the South Western Board's deputy Sub-Area engineer, Cornwall.



Mr. L. F. Weir

The Council of the Institute of Welding has awarded the Sir William J. Larke Medal for the best paper read to the Institute during the year to **Mr. R. G. Braithwaite,** M.Inst.C.E, M.Inst.W., welding consultant to Braithwaite & Co. (Structural), Ltd. His paper deals with the control of distortion in arc welding.

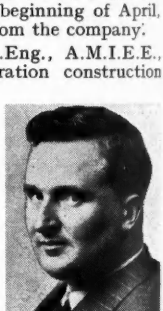
Mr. E. G. Chadder has been appointed senior superintendent engineer, sound, following **Mr. L. Hotine's** resignation from the B.B.C. Mr. Chadder joined the B.B.C. in 1923, and has since held several senior posts in the Engineering Division. He was engineer-in-charge at Aberdeen and Washford, and became assistant superintendent engineer, transmitters, in 1935, assistant superintendent engineer, studios, in 1937, and superintendent engineer, studios, in 1939. Mr. Chadder is succeeded by **Mr. F. Williams,** B.Sc., M.I.E.E., as superintendent engineer, studios. Mr. Williams joined the B.B.C. in 1925, and was successively engineer-in-charge of the studio centres at Cardiff, Birmingham and Manchester. He became assistant superintendent engineer, studios, in 1940, and head of the engineering secretariat last year.

Mr. J. M. Hollander, B.Sc.(Hons), M.I.E.E., M.Amer.I.E.E., was installed as president of the Electrical Wholesalers' Federation on 23rd March. Mr. Hollander was born in London in 1903 and educated at King Edward School, Birmingham, and Birmingham University. He was with British Insulated Cables from 1926 to 1930, spending three years in India. In 1933 he became managing director of Electro-Mechanical Supplies, Ltd., Coventry. During the war Mr. Hollander served in the Auxiliary Fire Service and later was commissioned in the Royal Air Force and attained the rank of squadron leader. He is a member of the Midland Aero Club, holding a private pilot's licence.

Mr. J. M. Hollander

Mr. A. S. Wraight resigned his managing directorship with Holland House Electrical Co., Ltd., as from the beginning of April, and is shortly retiring from the company.

Mr. E. S. Booth, M.Eng., A.M.I.E.E., A.M.I.Mech.E., a generation construction engineer in the North Western Division of the British Electricity Authority since vesting day, has been appointed engineer in charge of the co-ordination section of the Generation Construction Department at headquarters. Mr. Booth, who was born in Yorkshire, was educated at Liverpool University. After early experience with the Yorkshire Electric Power Co., he was appointed deputy city electrical engineer at Salford in 1946, and became chief engineer and manager on the retirement of Mr. L. Romero in 1947.



Mr. E. S. Booth

Mr. D. R. Johnson, sales executive of Bryce Fuel Injection, Ltd., of Staines, one of the Associated British Oil Engines group, has been appointed vice-president of Asso-

ciated British Oil Engines, Incorporated, of New York, the new American sales company set up by A.B.O.E. last year.

Major-General W. S. Tope, C.B., C.B.E., has been appointed a director of Henry Meadows, Ltd., of Wolverhampton and has been elected chairman.

Mr. H. J. Fountain, one of the founders of the Clarkson Thimble Tube Boiler Co., Ltd., in 1926, has retired from the position of managing director, but remains on the board of directors of the company as consultant. **Mr. S. W. Spurr** has been appointed to succeed Mr. Fountain as managing director. Mr. Spurr has been in the employment of the Babcock & Wilcox organization for over twenty years, during which time he has spent extended periods abroad on behalf of the company. He joined the Clarkson Thimble Tube Boiler Co., Ltd., three years ago as general manager and was appointed to the board in 1949. His early technical and practical experience was gained at the Loughborough Technical College and the Brush Electrical Engineering Co., Ltd., with whom he spent several years on the turbine side. For a considerable period he was engaged in commissioning, servicing and testing both turbine and boiler installations in this country and overseas. Mr Spurr is the son of Mr. G. R. Spurr, who for thirty-five years was borough and electrical engineer and manager at Walthamstow.

A dinner was held at the Peter Pan Café, Merthyr, on 16th March, by the staff and employees of the former Merthyr Electric Traction & Lighting Co., Ltd., to bid farewell to their engineer and manager, **Mr. G. Clark,** A.M.I.E.E. Since nationalization Mr. Clark has held an appointment under the South Wales Electricity Board, and is now leaving to take up a position with a firm of consulting engineers in Calcutta. Among the guests at the dinner were the Town Clerk of Merthyr, Mr. E. Roberts; Coun. D. Jones, J.P.; Coun. C. J. Griffiths, J.P.; Mr. C. Jones, borough engineer; Mr. F. J. Cursons, ex secretary of the company; Mr. W. T. Kenshole, ex manager, Merthyr Gas Co.; and Lt.-Col. R. Ll. Thomas, ex managing director, Thomas Merthyr Collieries, Ltd.

The London Electric Wire Co. and Smiths, Ltd., and associated companies have appointed **Mr. A. H. MacGregor,** formerly representative at their Birmingham branch, to be branch manager at Leeds, with effect from 1st April.

Sir John Cockcroft, director of the British Atomic Energy Research Establishment, was invested in Paris last week with the cross of Chevalier of the Legion of Honour for his work during the war.

OBITUARY

Mr. C. F. Johnson.—The death occurred on 30th March, at Croydon, of Mr. Cyril Frederick Johnson, chairman of F. W. Elliott, Ltd., clockmakers, and for forty-five years proprietor and later managing director of Gillett & Johnson, Ltd., Croydon.

Mr. W. F. Campling, O.B.E., A.M.I.I.A., works director of the West Chirton factory of De La Rue Insulation, Ltd., died on 1st April at the age of forty-five. Before joining the company in 1948 Mr. Campling was for twenty-three years with the County of London Electric Supply Co. During the war he was seconded to the Air Ministry and Ministry of Aircraft Production and became Director of Inter-Service Communications (D.D.C.C.P.).

WILLS

Mr. B. Higgins, secretary, London Division, British Electricity Authority, who died on 28th November last, left £4,307 gross (£4,214 net).

Major A. L. Chandler, chairman of W. T. Glover & Co., Ltd., a director of Galloway Water Power Co., Ltd., and British Insulated Cables, Ltd., who died on 2nd November last, left £76,835 gross (£75,254 net).

Mr. W. Binns, managing director of the Keighley Fan and Motor Co., Ltd., who died on 18th Sept. last left £7,242 gross (£6,308 net).

Mr. P. J. Waldram, retired civil engineer and surveyor, who made a special study of the natural illumination of buildings, left £14,207 gross (£14,137 net).

E.I.B.A. News

A BRANCH of the Electrical Industries Benevolent Association is being formed to cover Exeter and its environs. The inaugural meeting is being held in Exeter on 19th April. The convener of the meeting is Mr. Charles Lye, of 10, Southernhay East, Exeter, from whom further details can be obtained.

A cheque for £557 has been sent to E.I.B.A. as a result of this year's annual carnival organized by the North Counties Committee of E.D.A. It is claimed that this is a record for a provincial function.

Mr. W. W. Syrett, export sales manager of E. K. Cole, Ltd., has sent the proceeds from the sale of foreign stamps collected in his department. It is suggested that this new money-raising idea may commend itself to other companies in the industry who have considerable overseas contacts.

VIEWS on the NEWS

By REFLECTOR

IT is held to be one of the drawbacks of nationalization that the men do not know their "bosses"; their lives are ruled by remote controllers who dwell in a sort of Olympus. But a "Railway Foreman" tells the *Manchester Guardian* that in the old days the "boss" was a figure the rank and file were afraid of. "To-day, if a man wants to see his boss he just goes barging into him and he is always sure of winning." He goes on to say that "the trouble to-day is total lack of discipline; none of the bosses will make a stand because there is no backing from his immediate superior."

★ ★ ★

In *The Times* of 29th March, there appeared a letter from Mr. C. J. McNaught who recounted, "as a frugal Scot," how he had saved a surplus 1939 diary until it came to the time when the day of the week and the date would come together again. It happens this year and the date of Easter is also the same. What, may be asked, has that to do with my readers? Well, Mr. McNaught is a very old member of the electrical industry, having been associated with the late Howard Marryat in the firm of Marryat & Partner years ago. He still takes an active interest in the industry and in mathematical problems.

★ ★ ★

"Hordes of officials" is a term often employed in connection with publicly owned undertakings. Whether the term covers mechanics or not I cannot say, but if a story from Croydon is true it apparently does. It was stated by a member at a meeting of the local Chamber of Commerce that to install an immersion heater the South Eastern Electricity Board sent two electricians, two plumbers and two carpenters and charged "only" £18 for the job. The speaker said that a private contractor would have sent two qualified electricians and would have had to charge £24 to cover the cost of materials and labour. It seems to me that whoever did the work would not be undercharging at these rates, although I know that with the iniquitous purchase tax a 3-kW immersion heater may cost round about £10. I would like to know more about these costs and about the private army which the Board apparently despatches to do the jobs.

★ ★ ★

Electrical Housekeeping, the magazine which the Electrical Development Association produced before the war and was suspended during the war has reappeared. A copy of No. 1 of the new series has reached me. An attractive coloured cover contains a number of illustrated articles which, so far as I can judge, should appeal to women, and some recipes by Ester Purvis which may also appeal to men. The publication is available gratis to visitors to the Electricity Boards' showrooms.

★ ★ ★

Mr. R. S. Hudson averred in the coal debate in the House of Commons last week that "one truck in every four coming to London for generating stations carries nothing but dirt, and one ship out of every four . . . . passing up the Thames contains nothing but dirt." If this is to be interpreted literally, the remedy seems to be eliminate every fourth truck or ship.

★ ★ ★

A message to the *Daily Express* from a Sydney correspondent says that gold has been struck by engineers working on the Snowy River hydro-electric project. "The authorities have tried to keep the discovery secret to avoid disturbing the force of labourers who will number 10,000 as the project gets under way." From this it seems possible that the scheme (estimated to cost £200 million) may pay for itself during the period of construction instead of some years after completion.

Traction Convention

Discussions at Remaining Sessions

CONCLUDING the report of the discussions at the recent convention on electric railway traction held at the Institution of Electrical Engineers, in London, we give below a summary of the later sessions.

The fourth session (chairman: Dr. J. L. Miller) was concerned with equipment.

Mr. C. M. Cock said that the single contact wire was quite unsuitable for high-speed main lines, but it had some possibilities for sidings. The combination of the single contact wire and the single catenary cable should be employed in preference to any other more complicated arrangement for high-speed running. Part of the simplification would be elimination of automatic tensioning, which would seem to be an unnecessary extravagance even with extreme ranges of temperature. With regard to the claim that cadmium copper contact wire eliminated stretch, his experience was that within a few months very little stretch occurred. Reinforced concrete structures were admirable from the maintenance point of view, but unless standard types were produced in quantity, the cost would exceed that of steel structures.

Pantograph Preferences

Mr. R. C. Wade suggested the formation of a committee of representatives of railways, equipment contractors and pantograph makers to collate statistics and experience. The modern tendency to adopt a hard conductor of the cadmium copper type and increased tension seemed to require extra pantograph pressures. Rolling stock engineers generally preferred a flat pantograph, whereas the equipment engineer preferred the curved type for fast running over junctions.

Mr. J. M. Ferguson (English Electric Co.) said that a satisfactory design for comprehensive lightning protection could only be made after a protective level had been adopted, based upon, and less than, the impulse level of all the equipment on the system.

Mr. L. A. Ginger (Electrical Engineer's Dept., King's Cross) said that on the Liverpool Street/Shenfield route, the air flow over the rectifiers and out of the buildings was controlled so as to ensure that in winter the best use was made of the heat losses from the rectifiers. In case of a prolonged shut down, thermostatically controlled tubular heaters should be provided.

Substation Improvements

Dr. J. C. Read (B.T.H. Co.) suggested improvements in substations. First, in relation to a.c. switchgear, he thought there were possibilities of reduction in cost on the lines pointed out by Mr. S. B. Warder in his paper. Secondly, transformers in substations for railway service and in some cases the rectifiers were very much larger than they need be. Closer co-operation between rectifier designers and those responsible for the layout could lead to economies. Thirdly, in relation to cost and size of buildings, he had been greatly impressed with the possibilities of some of the new building methods which the Midland Region had experimented with.

Mr. H. Giesbers (The Hague, Holland) gave a short account of new substations on the Netherlands railways.

Mr. H. H. Swift (British Railways) thought that the design of overhead lines generally needed overhauling to bring down the cost, which came to about one-third of the cost of the total electrical equipment in a railway electrification scheme (omitting the cost of the rolling stock and the civil engineering work). In the Eastern Region there was under test at present a novel design of structure made of rolled bars, spot-welded together.

A number of other speakers took part in the discussion, including M. Walter, of the French Railways. Owing to lack of time, the authors of the papers were unable to reply.

The fifth session (chairman Mr. G. H. Fletcher) dealt with locomotives and coaches.

Mr. P. L. Mardis (English Electric Co.) said that economic locomotive design depended on conditions of track. For instance, in the United States heavy axle-hung motors with solid spur gearing on high-speed diesel locomotives operated successfully; but only because of the use of rails weighing 130 to 152 lb/yd and high-grade track maintenance.

As a general rule lightweight coach construction cost more. In practically every case, however, assessment of the overall cost—say, over 30 years' operation—would show a decided saving with the use of lighter equipment.

Mr. G. W. Bone (Davey Paxman & Co.), referring to Mr. F. A. Harper's statement that the diesel-electric shunting locomotive now held an established position with British Railways, whereas the main line locomotive was as yet a doubtful economic proposition, asked if the general purpose locomotive did not represent a more encouraging proposition. The high utilization necessary to offset its high first cost could presumably be obtained by a combination of duties varying from shunting to mixed traffic and passenger operation.

Mr. J. Kater (Netherlands State Railways) said that he did not share the view that, so far as B.B. locomotives were concerned, the maximum tolerable speed would be round about 50 m.p.h., especially for locomotives with articulated bogies. In some trial runs with B.B. locomotives on the French railways at up to 70 m.p.h. the riding qualities were remarkably good. For higher speeds he agreed that the C.C. type would be preferable.

Aluminium Alloy Cars

Mr. W. S. Graff-Baker said that London Transport's aluminium alloy car construction was not regarded as an adventure. They were satisfied with it technically, and, although it cost more to build than a mild steel car, over a thirty-year life a profit would be shown unless the price of steel went down far more. It was, however, necessary to take stringent precautions to protect the alloys from contact with dissimilar metals, iron dust and red lead and similar paints.

Mr. F. Whyman (Metrovick) said he was surprised to see it stated in Mr. E. S. Cox's paper that the driving wheel diameter was affected by the underframe design. In his own experience it was usually settled as the smallest possible diameter with the required size of motor and the minimum gearcase clearance.

Mr. C. C. H. Wade (English Electric Co.) referred to remarks about the ratings and performance of main line locomotives 10000 and 10001. He pointed out that they were not designed particularly for British conditions. They were built with some equipment which happened to be going through for another part of the world; their performance demonstrated their universal application.

Mr. Matthews said that it was a pity that single-motor jack-shaft drive had been done away with. It had given way to two motors, each carrying its own jack shafts really, which surprisingly cost less. A number of shunting locomotives in his area were single motored and after four years' use there had never been a service failure.

Electric Braking

The sixth session (chairman: Mr. J. E. Calverley) was on control and auxiliaries.

Mr. C. M. Cock said the advantages of electric braking might be summed up as economy of maintenance of brake gear, easy control of trains descending long gradients and some economy from regenerative braking. Clearly there was no economy of energy consumption in the case of multiple-unit trains requiring, as they did, all the axles of the train unit to be motored. The case for electric braking on locomotives was different, for the cost of additional equipment for electric braking was only a proportion of the total cost.

Mr. W. T. Gray (Metrovick) said with regard to combination switching that in his view the tendency was to use individual switches in place of cam groups at the present time. The best place for control equipment was on the underframe in dust-tight cases. He drew attention to the danger of brake-block dust being drawn into the chamber when control equipment was "upstairs."

Mr. A. W. Simmons (Westinghouse Brake and Signal Co.) observed that the electro-pneumatic brake was particularly

suitable for the intensive type of service met with on suburban and city electrifications; it was equally advantageous for other types of traffic. The American electro-pneumatic brake was speed-controlled, the extra-high pressures being controlled by the speed of the train instead of by retardation. Each car had its own speed controller which proportioned the brake cylinder pressure to suit the speed. Any one axle locking could have no effect on any other axle. Wheel slip detectors with very high brake forces and little margin for skidding could be used. No doubt retardation control was more suitable, however, for the conditions of service described in the paper on electro-pneumatic braking.

Use of Rotary Amplifiers

Mr. E. A. Binney (English Electric Co.) expressed the view that series motor braking would continue for some time to come. The rotary amplifier had great possibilities in traction and had been used widely and satisfactorily in other industries. He hoped motor-coach braking would not be considered only from the point of view of dividends on paper, but also from that of the operator and of reduced operating cost and increased maintenance time between operations.

Mr. W. S. Graff-Baker said that while the purchase of more metadyne equipments was not at present contemplated, they had completely justified the financial calculations that had been made. The difficulty of regenerative systems was that the voltage had to be raised inconveniently.

Monsieur Ruhlman (Paris Metropolitan) said that retardation control equipment lent by the London Transport Executive had been tested with satisfactory results. It was now being fitted to new rolling stock for the Ligne de Sceaux and included in the design for new stock for the Ligne de Vincennes.

Motorman's Responsibility

Mr. H. L. Preston (London Midland Region) said that despite all the automatic and other features introduced into L.T.E. designs, the motorman had still overriding control and could readily produce poor results from the excellent apparatus at his command.

Mr. C. I. Stevens (Vacuum Brake Co.) described an electro-vacuum brake system now undergoing works test. Mr. W. D. Sheers (Metrovick) produced oscillograms to show the effectiveness of transformers in connection with voltage jumps.

Mr. A. W. Manser (London Transport) said that even with a system like that of London Transport it was ten or twelve years before the full cost of maintenance of the equipment could be ascertained.

Prof. M. Semenza (Italian State Railways) said they had been disappointed that the three-phase installation in Italy had not solved the problem of automatic regeneration, which would only seem to be possible with a fully braked, or passenger, train. Where there was considerable goods traffic it was not a feasible proposition because only the locomotive could regenerate.

A number of other speakers took part in the discussion. The authors were to reply in writing.

Roller Suspension Bearings

The seventh session (chairman: Mr. C. M. Cock) concerned the design and maintenance of stock.

Mr. W. J. A. Sykes (Railway Executive) said that roller suspension bearings were attractive, but there was need for caution when they were applied to third rail electrification systems, especially when roller bearing axleboxes were also contemplated. The presence of the axle earthing brush might not give complete protection to the bearings in the event of a short circuit between collector shoe and bogie frame. Double reduction gear offered attractive possibilities in the way of obtaining a lighter motor, but it appeared to bring with it a severe restriction on maximum speed, and he hoped that motor designers would be able to overcome this difficulty.

Mr. P. Mardis (English Electric Co.) said that the designer could materially assist in reducing maintenance cost by eliminating weak points from future designs.

Mr. Ratcliffe Wright (formerly B.A. Southern and Western Railway, Argentina) agreed that the electric units used in Argentina had given highly satisfactory results. Wherever the price of diesel oil was suitable and there were services that could take advantage of the high availability of those units, they

should be economical as compared with steam operation.

M. Blondet (Alsthom, France) said that for many years the French Railways had insisted on using compensated motors on their d.c. 1,500 V locomotives. They allowed a very large amount of speed regulation by field weakening and that was very important from the operator's point of view.

Mr. H. Newsam (Metrovick) said that many years ago, with low-speed motors, the pinions were large and there was no difficulty in providing a key and keyway, but nowadays there was continual pressure for the speed of the motors to be increased and their weight reduced. His firm felt that sometimes the keyway unduly weakened the pinion body and had actually omitted the key in a number of cases. The development of roller bearing suspension in railway service would be a great contribution towards lengthening the time between major overhauls of motors.

Several other speakers took part in the discussion and in conclusion Professor Semenza expressed gratitude to the Institution of Electrical Engineers for organizing the Convention.

Gas Turbo-Generators

Belgian Commission's Report

A STUDY of the possibilities of gas turbo-generation of electricity by A. Jaumotte and Van Mele has been published by the Société Royale Belge des Ingénieurs et des Industriels (Mémoires, Series B, No. 5, 1949).

This thirty-page report of the Commission Économique du Comité Belge de la Turbine à Gaz, No. 1, "Application de la turbine à Gaz à la Production d'Énergie Électrique," is printed in French and divided into three parts. The first outlines the characteristics of different types of gas turbine and cites examples of plant already in service as well as experimental and projected designs. The relative thermal efficiencies of the three types are estimated and first costs (including all plant and electrical components as far as the output transformer) summarized as: open cycle 5,000 francs/kW output without heat exchanger and 6,000 francs with; twin shaft open cycle with heat exchanger 6,000 francs; semi-closed cycle 6,000 francs, and closed cycle 6,500 francs (140 Belgian francs=£1). Cost and complexity are said to justify the last-mentioned cycle only for large outputs.

The second section of the report is concerned with fuels. Costs of the heavier oils are considered more reasonable than those of diesel oils and petrol. Natural and blast-furnace gases are described as ideal, almost free from ash, but the overall efficiency would fall by 1 per cent, due to the replacement of the fuel pump by a compressor of lower efficiency than that of the main compressor. The underground gasification of coal is not discussed in detail in this report. A closed cycle turbine fired with pulverized coal would be 10 per cent lower in efficiency and cost 15 per cent more than the equivalent machine burning fuel oil.

The last section of the report compares the first costs of steam and gas turbines, both types assumed to have the same service life, but taking labour and maintenance costs for gas turbines as two-thirds of those for steam plant. Operating costs plotted against hours/year utilization are almost coincident for open, semi-closed and closed cycle machines. When burning heavy or extra-heavy fuel oil, operating costs are said to be comparable with those of steam plant developing 25 MW, but do not compare favourably with a 50 MW steam installation.

In general the report does not consider that gas turbines burning fuel oil will have an economic advantage over steam turbines in Belgium, but turbines burning blast-furnace gas might reduce the operating costs of 25 and 50 MW installations running for 4,000 hours a year by 7 and 12 centimes/kWh respectively.

Chilean Market

ACCORDING to the U.S. Embassy in Santiago, Chile, a reasonably good market exists in that country for high-current, low-voltage motor generators and special electrical machinery and equipment for the copper, coal-mining and nitrate industries as well as among manufacturers. The Government is encouraging the establishment of new manufacturing industries. The sale of motor generators and special electrical machinery and equipment in Chile is usually effected through exclusive sales' agents and through large importers and distributors of industrial machinery.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PROJECTS

Improved Hairdryer

AN improved hairdryer brought out by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, can either be held in the hand or fixed in a special stand supplied as an optional extra.

The dryer weighs only 2 lb and the comfortable handle has two thumb switches to provide warm or cool air or to switch the dryer on or off. A movable stem on the stand allows the user to direct the air stream as required, leaving both hands free. The consumption of the motor is 30 W and that of the heater 500 W. Six feet of twin circular cream-coloured flex is supplied. The body of the dryer is a cream plastic moulding and the stand is a cream-enamelled aluminium die-casting. The price is 4 gns, plus 1 gn purchase tax in this country only. The stand costs 16s, plus 4s purchase tax (purchase tax does not apply when the stand is ordered separately). Deliveries will commence this month.

Drink Mixer

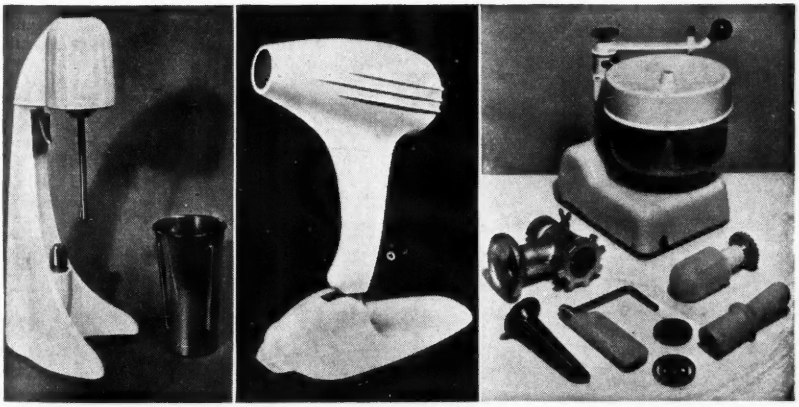
A drink mixer suitable for milk bars, restaurants, hotels, etc., or in the home, is announced by the GENERAL ELECTRIC CO., LTD. Many improvements on existing designs have been made. The die-cast supporting pillar and motor casing harmonize to provide a pleasing continuity of outline. The finish is in white enamel. The totally enclosed series wound universal motor, which runs at 12,000 r.p.m., is resiliently mounted. It is fitted with an oil retaining journal bearing at the top and a ball bearing at the spindle end.

The mixer is automatically switched on when the stainless-steel beaker is placed in position on a spring-loaded stud, which operates a mercury tube switch. A spring-loaded isolating switch is fitted under the base so that if the mixer is tilted or raised off the counter, the mercury switch becomes inoperative until the mixer is again standing vertically. An automatically illuminated head sign can be fitted to order, when required in considerable quantities. Deliveries are expected to commence early in June. The list price is £9, plus £2 5s purchase tax in the United Kingdom. The stainless-steel beaker is listed separately at £1 10s, plus 7s 6d purchase tax.

Mixer-Mincer

In the "Lammix" mixer made by HUWOOD COMPONENTS, LTD., St. Peters, Newcastle-on-Tyne, 6, the operations are performed by a revolving bowl, with a geared rim, driven by an electric motor. A

G.E.C. drink mixer and hairdryer. On the right is the "Lammix" revolving-bowl mixer



dolly, fixed to an arm adjustable to any position desired, is arranged so that the top can be geared to mesh with the rim of the body. A scraper directs the mixture to the centre of the bowl.

In folding and creaming operations the dolly is set against the geared rim of the bowl but for heavy mixes it rotates by the action of the mix itself. When used on a mincer, the base of the machine is turned on its side and the mincing unit is quickly attached. Attachments are available for sausage making, whisking, grating, slicing and juice extracting. The price is £23 15s plus (U.K. only) £5 18s 9d purchase tax.

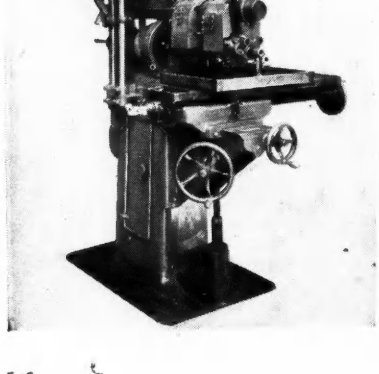
Plastic Gear Wheels

It is announced that number wheels and pinions made from acrylic moulding material are now available from H. J. THORMAN ENGINEERING CO., LTD., 5, Elstree Way, Boreham Wood, Herts, for use in house service meter registering mechanisms.

Machine Tool Drives

The range of "Powalastik" individual driving units introduced by SMITH BROS. & WEBB, LTD., Stratford Road, Birmingham, 11, permits easy conversion of belt driven machines to independent motor drive. The smallest size in the range can be fitted with pulleys of up to 11.5in diameter by 14in face, and driven by motors from 1 to 5 h.p. The largest size will take pulleys of up to 19in diameter by 18in face, and can be fitted with motors of up to 10 h.p. The standard tube lengths are 24in to 36in, the base bracket affording easy adjustment to obtain the shortest possible centres. The totally enclosed "V" belt drive can be arranged at the right- or left-hand side and a lever-operated quick release toggle mechanism permits tension on the main drive to be relieved when changing speed.

"Powalastik" individual driving unit fitted to a horizontal milling machine



Excess Temperature Protection

Electrical equipment may be safeguarded against excessive temperatures at various strategic points by using the type MQ switch offered by the THERMOSTATIC CONTROLS CO., Avenue Road, Hampton, Middlesex. This device comprises a sealed glass container measuring about 1in long by $\frac{3}{8}$in diameter, housing two tungsten contacts bridged by a low-temperature alloy which, on reaching its melting point due to a temperature rise in its surroundings, liquefies and breaks the circuit. This switch, which can also be arranged to make a circuit, must be replaced after it has operated and a small moulded spring-clip holder is available to facilitate this.

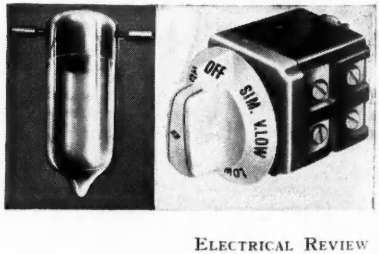
Rotary Switches

A new range of a.c. rotary flush switches has just been introduced by "DIAMOND H" SWITCHES, LTD., Gunnersbury Avenue, London, W.4, for use on electric cookers and other domestic appliances

There are two types. The small size 1AC series, which is $1\frac{7}{8}$in sq by $1\frac{3}{8}$in overall depth, is available as single pole and double pole, on and off single pole, three heat single pole, two circuit and single pole two-way. The larger size, 2AC series, which measures $1\frac{7}{8}$in sq by $2\frac{1}{4}$in deep, provides for almost all known circuits in both single and double pole up to the well-known 9-heat selector switch.

The rated capacity is 15 A 250 V or 20 A

The MQ device for protection against excess temperature and (right) "Diamond H" flush-mounting switch type 2AC



115 V for the simple 1AC series circuits, the multi-circuit 2AC series being rated at 15 A 250 V per circuit. A variety of fixing and terminal arrangements make these switches of particular interest for export.

Dust Collection

In removing the dust from electric motors it is usual to use compressed air or a pressure fan for blowing out such accumulations, but the attendant clouds of fine dust dispersed have obvious disadvantages. A complete portable unit which will collect this dust in a satisfactory manner is now being made by DALLOW LAMBERT AND CO., LTD., Spalding St., Leicester. The unit can be provided with either a plain table or a turntable on which the motors or other machine parts to be cleaned are placed, a suction hood at the end of the table ensuring effective dust collection by means of the "Drymat" unit mounted at the rear.

Heavy-duty Plug and Socket

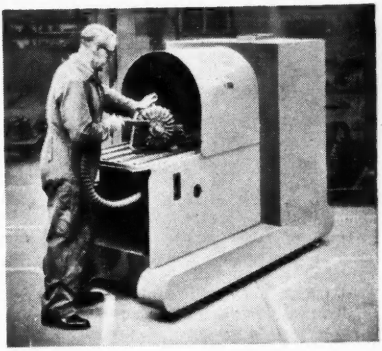
An addition to the "Breeze" range of accessories made by the PLESSEY CO., LTD., Ilford, Essex, is a heavy-duty plug and socket incorporating two removable 100 A pins and one 19 A pilot pin in a robustly designed brass housing. The unit, which is waterproof when mated, is designed for panel mounting, but may be used as a line coupler with standard fittings.

Thermo-Metals

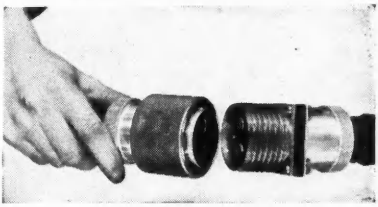
Four new grades of temperature sensitive bi-metals are announced by HENRY WIGGIN AND CO., LTD., Wiggin St., Birmingham, 16, among which R.667 has high electrical resistivity and is suitable for use in circuit breakers. "Veriflex" has a range of maximum sensitivity at 300 to 600 deg F, and is designed for use where high rates of deflection are required at these temperatures. For high temperature applications "Autoflex" has been introduced, while "Rayflex" is recommended in place of "Highflex 45" in thicknesses below 0.01in, where it has more constant deflection properties.

Thickness Meter

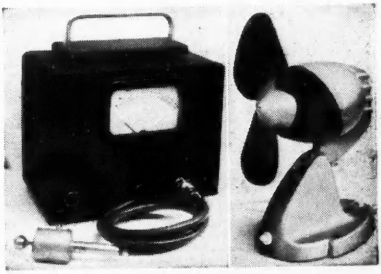
A portable mains-operated instrument for measuring the thickness of insulated coatings on any metallic surface by the capacity method is now being made by the M.P.J. GAUGE AND TOOL CO., LTD., Hanson's Bridge Road, Erdington, Birmingham, 24. Using a single contact head, in which the contact electrode is a highly polished sphere, it gives spot readings unaffected by moderate curvature of the surface under test or the thickness of the base metal. Various measuring heads can be supplied for a variety of applications and the meter can be sealed for different thickness ranges up to about 0.05in of coating.



"Drymat" dust collection unit



"Breeze" heavy-duty plug and socket



M.P.J. thickness meter and (right) one of the new G.E.C. rubber bladed table fans

Table Type Fans

Two table type fans of unusual design possessing novel safety features are announced by the GENERAL ELECTRIC CO. The employment of rubber fan blades on the new 8in a.c. table fan has made it possible to dispense with a guard. The blade is sufficiently rigid to produce an air

displacement of 600 cu ft a minute yet is flexible enough not to damage the hand. Pressure die castings are employed for the base and for the housing of the totally enclosed shaded pole induction motor running at 2,100 r.p.m. The fan, which can also be used for wall mounting, is finished in silver grey.

The 16in a.c. oscillating fan can also be used as a table or bracket model. The design of the metal blade has made it possible to eliminate the front, or cage-like portion of the guard, leaving only a "frame" to protect the outer edges of the blades. The leading edge of each blade is overlapped and thus completely shielded by the trailing edge of the blade in front of it. The totally enclosed motor is modelled on aerodynamic lines, the oscillating mechanism being out of sight. A choke type regulator provides three speeds and an "off" position. The fan is finished in old gold.

The rubber bladed fan is priced at £3 5s plus (U.K. only) purchase tax 16s 3d. The 16in fan costs £10 5s plus £2 11s 3d.

Washing Machine

The new de luxe model washing machine brought out by H. FISHER (OLDHAM), LTD., Glodwick Road, Oldham, is fitted with a 3 kW element to heat the water. An extra large tub is incorporated and there is a built-in table for the wringer bowl at the back. A pump is built in and the wringer has a double safety device with a knee-high clutch release in addition to a release bar running the full length of the wringer on both sides. The machine is mounted on concealed castors for easy moving. The tub, top and lid are finished in vitreous enamel, the cabinet body being of white or cream stove enamel. The price is £55 10s, plus (in this country) £14 8s 7d purchase tax. A vitreous enamel table top is supplied as an extra.

Light-weight Iron

A light-weight model of the "Mary Ann" automatic iron brought out by THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1, weighs about 5lb and, like the heavier model, has a double pointed soleplate which gives 30 per cent more ironing surface and enables it to be used in both directions without ruffling or creasing the fabric. Other features are an unbreakable steel cover, vitreous enamelled in pale cream; a heat-resisting black moulded handle; an asbestos liner; a heat selector dial; thermostatic control and 9ft of safety flex with connector-less side entry. The a.c. model costs 39s 6d and the a.c./d.c. model 42s. An asbestos lined stand and flex tidy costs 4s, plus 1s purchase tax in the United Kingdom.

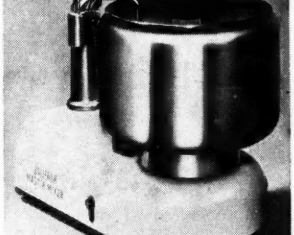
Small Restaurant Mixer

The "Master Mixer," marketed by BALLERUP, LTD., 77, Great Peter Street, London, S.W.1, is primarily designed for use in large household kitchens, small restaurants, and country hotels. The standard machine, which retails at £44, plus purchase tax in the United Kingdom, can be used for mixing, stirring, whipping, kneading, chopping meat, filling sausage casings, etc. Additional attachments available include a coffee grinder, potato peeler, potato chipper, slicer, vegetable shredder, grater and quick whipper.

The stainless-steel bowl of this appliance rotates and the mixture is beaten by the action of an adjustable spring-loaded arm with a rotating "dolly" in conjunction with a scraper, ensuring effective mixing, kneading, mashing and stirring of the heaviest mixes.

(Left) Fisher washing machine

(Below) Ballerup mixer



CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Manufacturers and Overseas Trade

YOUR sub-headline "Further Decline in Exports" in the "Overseas Electrical Trade" section of the *Electrical Review* of 30th December, 1949, caused me little surprise. I wondered how many realize how difficult it is sometimes to trade with the Old Country, much as many of us would like to do so.

I am the electrical engineer of a large company in the Western Hemisphere where most of the equipment has for years been obtained from North America. Since the war, and particularly since devaluation, our policy has been to buy from the United Kingdom whenever possible, but the first barrier is the lack of standardization between the Old World and the New.

We are told on the radio and in the Press that "all-out drives" are being made, but we ask in vain for comprehensive catalogues, and sometimes receive an old pamphlet, "All prices cancelled," with details so meagre that inquiries have to be sent with copious descriptions and detailed drawings. One would imagine by now that such simple details as motor frame numbers of American and Canadian manufacturers would be known in England, but such is not the case apparently.

Large manufacturers whose names are household words on both sides of the Atlantic do not seem to have each other's catalogues; to quote a catalogue number of a Canadian or American company of practically the same name as in the United Kingdom produces a blank reply. It is almost impossible to buy English spares for American machines, even when the latter are built under licence in the U.K., as parts do not fit when they arrive here.

A circular just issued by our Local Commodity Control office gives approximate delivery dates of U.K. plant and machinery. The list, which originated from the Colonial Office, London, gives such items as certain types of railway equipment up to 5 years, power cable 2 years, boilers 3½ years, certain types of motors up to 3 years. There are three pages of such figures which we know from experience can sometimes be extended by several months. None of this is helping the British engineering trade in this part of the world. To a large extent engineers are losing confidence in the reliability of statements made, as if they are unreliable in one direction it is naturally expected that they may be unreliable in others. We have much sympathy with your difficulties, but sympathy will not keep a large plant running.

In the letter accompanying the list mentioned above, we are urged towards forward planning, but replacements cannot wait that long and, with the uncertainties resultant upon devaluation, the type of Government we are likely to have for the next five years, taxes, etc., it is little wonder that few companies can afford to gamble so far ahead in these unstable days. For years we have heard of overseas markets being studied, but there is still little evidence of it. Hard as it may seem, United Kingdom manufacturers will have to do the adapting, not North America, and until this is done, there will be "further decline."

ENGLISHMAN ABROAD.

[The sub-heading referred to merely indicated a decline in total electrical exports in November as compared with the previous month; they were actually higher than in November, 1948. For the whole of 1949 there was an increase in electrical exports amounting to over 17 per cent. Other points in the letter are dealt with in our leading article.—Editors, *Electrical Review*.]

Milk Cooling

WE have read with considerable interest the article on milk coolers which appeared in your issue of 17th March. We feel, however, that this company and the Wallis Tin Stamping Co.,

Ltd., should have due credit paid to them for the introduction of the "Klim Kooler" which appears to be the only one of its type that has been offered at a price which the smaller man can afford. Furthermore, Models 60, 100 and 150 have been thoroughly tested and approved by the National Institute for Research in Dairying at Shinfield.

Although the whole of the refrigeration industry had been requested by the Milk Marketing Board to produce a machine capable of cooling milk for the small farmer at a price under £100, this company was, in the first instance, the only one which seriously considered the proposal, and in collaboration with the Wallis Tin Stamping Co., produced the "Klim Kooler."

The article did not mention one of the main features of the "Klim Kooler," namely, the build-up of an adequate ice bank in order that the returning hot water should pick up the stored latent heat, which keeps the last gallon of milk passing over the cooler down to the desired temperature providing that the milk passed over it is within the capacity of the machine. This stored latent heat in the ice bank also permits a certain amount of bad timing on the part of the farmer, mentioned in the article where the "d" pan could actually be emptied with the water circulation still going on.

Slough.

P. E. THOMAS,
Technical Director,
PEERLESS REFRIGERATION, LTD.

Stronger Fire Bars

THE use of a steel rod inside an electric fire element is advocated by Mr. F. J. Allen (*Electrical Review*, 14th March).

This method was tried and discarded by us many years ago. After a period of use the steel scales, expands and bursts the fire bar. Other metals were ruled out because of their cost.

Walsall.

W. E. LORTON,
Sales Dept.,
H. FROST & CO., LTD.

F.B.I. REPORT

Auxiliary Generating Plant : Industrial Tariffs

THERE was a net gain of 274 in the membership of the Federation of British Industries in 1949, raising the total to 6,297, including 279 trade associations. The report for the year contains a comprehensive review of the Federation's activities in various phases of national policy—production, trade, taxation, etc., and the work of its various departments is reviewed. In the latter section, it is mentioned that F.B.I. nominees have been appointed to ten of the twelve Electricity Consultative Councils in England and Wales. As a result of meetings between representatives of the Federation and the British Electricity Authority, the B.E.A. agreed to recommend to Area Boards that restrictions in the use of auxiliary generating plants now in use or for which firm orders had been placed should continue to be waived; that no penal charges for standby supplies should be imposed; that these charges should not exceed the capital charges appropriate to the distribution and generating capacity reserved for this purpose; and that where existing tariffs included a maximum demand charge on an annual basis, the consumer should have the option of revising this to a monthly basis.

In connection with the B.E.A.'s review of tariff structures, the Federation has agreed to submit a memorandum on industrial tariffs and oral evidence in support of the memorandum will be given.

The last section of the report covers the Federation's general services, including the dissemination of information on many industrial and allied subjects, the answering of inquiries, and publications. Appended to the report are particulars of the Federation's regional arrangements; diagrams of the organization; and lists of representatives on Government and other committees.

The American Market

THIS is the title of an 84-page supplement issued by the *Advertisers' Weekly* to its subscribers and to other interested people. In it a number of American authorities give advice on many aspects of selling in the United States. Public taste, market research, packaging, advertising in its various forms, prices and other matters with which British exporters should be acquainted, are dealt with in a knowledgeable and forceful manner.

Scientific Instruments

Impressions of the Physical Society's Exhibition

From a Correspondent

ONE dictionary definition of an instrument is "tool, implement for delicate or scientific work" or "thing used in performing an action." The incompleteness of the first definition was emphasized by the 34th Physical Society Exhibition of scientific instruments and apparatus, held from 1st to 5th April, at the Imperial College, South Kensington, for so many examples were shown of instruments designed for industrial and power applications that it is obvious that modern management insists upon scientific control of its processes, many of which are far from delicate and which, before the introduction of instruments, were anything but scientific.

Trend of Development

It is noticeable that electrical instruments of the indicating and recording types are not now receiving much individual attention, but are being accepted by the instrument designer as a component, incorporated to show the final result from his apparatus, or to check the performance of the complete instrument in its various stages. It is true to say that, fundamentally, the movement of the electrical instrument to-day would immediately be recognized by almost any instrument maker of 50 years ago. In the technique of manufacture and the use of modern materials, however, there have been very great changes and most modern electrical instruments are worthy of attention in this respect.

To the power engineer, a little time spent in studying the facilities now provided for measuring, indicating or recording an electric current will be amply repaid, as for example, in the loading of instrument transformers; legibility of scales; appearance of instrument panels; scaling to suit the particular circuit conditions; recording of very low currents or quantities varying at a high speed; measurement at a distance, and so on.

Looking round the exhibition with these and similar considerations in mind is a most enlightening experience, for nowhere else in this country is there brought together at one time so much apparatus showing the progress of scientific instrument design and manufacture. It should also be remembered that the exhibition is confined primarily to new designs and that many manufacturers, particularly the long-established firms, do not and cannot do justice to the full range of their products. It is hoped that before long, an opportunity may be afforded for a general display and demonstration of all that the British instrument manufacturer can do.

Some well-known manufacturers of electrical instruments were not represented, but it must be realized that the emphasis on new developments at this exhibition may be somewhat of a handicap for, with the best will in the world, prototypes and new designs for exhibition cannot always be produced at the correct time, particularly when the overall emphasis is on production.

Craftsmanship Maintained

The exhibition gave an impression of great activity in research, development and design of instruments and associated apparatus. It was good to see that traditional craftsmanship amongst the younger generation in the industry had not been neglected. The Physical Society has revived its competition for apprentices this year, and the examples of entries shown reveal a continuing high standard of skill in both draughtsmanship and instrument making.

This year instruments for automatic process control were not included specifically, but electronics and the use of thermionic valves played a larger part than ever.

The majority of modern instruments can be split up into three essential elements; the pick-up device, which produces a signal proportional to the quan-

tity being measured; the amplifier or transmitter of the signal; and the display unit, an indicator or recorder, showing the required result. There are, of course, simple cases where these elements may be combined, but the division is useful in considering problems of instrumentation or reviewing developments.

As to the pick-up, or initial measuring device the display contained a variety as diverse as the number of functions under examination. Apparatus being demonstrated dealt with practically every physical and electrical measurement but the emphasis was on radio-activity. Research and development in nuclear physics and the use of atomic energy have called for completely new designs of apparatus and equipment. Industrial applications of the techniques learned during the past few years are now making their appearance. An example is the measurement of material thickness by radio-active means. Radiation detection and measurement apparatus, varying from simple Geiger-Müller counters to radio-isotope analysers, was to be found on many stands.

Electronic Amplifiers

Most apparatus included some form of electronic amplifier and there were on view at least twelve different designs of d.c. or a.c. amplifiers suitable for application to the measurement of small currents or potentials. Then, again, many exhibits incorporated similar circuits within the equipment.

The display device or indicator referred to above was to be seen in many forms and it was obvious that more attention has been paid to style and finish as well as to the specification of the final indicator. Scales are now being selected with greater care, bearing in mind that ease of reading under actual working conditions is of first importance.

For quick visual checks of general conditions one manufacturer showed an instrument with a broad pointer and heavy, well-spaced scale marks. On the other hand an accurate spot reading or adjustment demands a finely divided scale with knife-edged pointer, adding the anti-parallax mirror only when the absolute accuracy of the equipment justifies it. Scale shapes, too, can be chosen so as to enlarge the actual working zone while still allowing peak or overload readings to be made. Most manufacturers are prepared to co-operate and advise in supplying the indicator to suit the job.

There seems to be a tendency toward smaller instrument dials, preferably in rectangular form with a narrow frame, and several well-proportioned designs of case were to be seen with scale lengths from 2in up to 6in. A sample set of square instruments in green cases on a cream panel was also shown. The scales were also tinted green to demonstrate the claim of reduced operator fatigue. Many of these types can also be provided with internally illuminated scales.

Compact Dynamometer

Some examples of new miniature electrical instruments covering all types of movements were to be seen and also a neat and small frequency meter with five vibrating reeds for use on 50 c/s.

A new compact dynamometer movement has been produced which, even in its polyphase, triple element, form is little deeper than a normal indicating ammeter or voltmeter. Magnetic damping has been included in this and the other new movements mentioned above.

Graphic recording instruments have received some attention during the past year, an outstanding example being a small, compact moving coil grapher in a metal case which has a 3in wide chart with two paper speeds. It writes directly in ink on paper by siphon pen and can be fitted with adjustable maximum and minimum alarm contacts, the pen movement being restricted between the settings.

A compact single-pen operation grapher or marker, with an eight-day mains-driven drum chart, was shown. This was developed for statistical investigation of consumer demand when using water heaters and similar appliances and records the time and duration only of the load.

Three new recording instruments for industrial process application were exhibited. The largest one has a 10in wide chart with self-contained motor-driven pen and integral potentiometer balance. Full scale deflection is given for 10 mV. The other two designs were for servo operation. The quick response pattern, suitable for frequencies up to 15 c/s, had

two movements writing on a duplex roll chart.

For portable use one type was shown which could be servo-operated from any electrical movement or mechanical device to which a capacitance link could be fitted. The whole equipment can be accommodated in a portable case with a disc chart record.

For high-speed recording and special applications there were other patterns, notably the Duddell electro-magnetic recording oscillograph, still in the forefront of such equipment. One model provides records up to 7 kc/s.

The use of electro-sensitive paper was a feature of several other recording instruments. One of these does not use a moving stylus, but has 32 equally spaced electrode points across the 35 mm track of "Teledeltos" paper, on the edge of which timing marks are made. Each of the 32 points is energized at a signal level slightly different and evenly spaced from its neighbour. Each marks the paper as its pre-set level is reached and the waveform trace, up to 2 kc/s, is made.

Electronic means of making or transmitting a measurement continue to progress and the reluctance of plant engineers to introduce valves into their equipment seems to be diminishing. Numerous other examples of electronic applications were to be seen in the fields of telemetering, high-speed recording of high-frequency signals, amplification of weak currents and wave form analysis.

The magnetic amplifier is now no novelty, but its usefulness and that of its forerunner, the d.c. current transformer, for measurement and control, continues to grow. A new example of the saturable reactor was a d.c. voltage transformer equipment for 2,000 V d.c. traction service, enabling the local metering and telemetering circuits to be isolated, electrically from the line.

Control Apparatus

Power control by means of saturable reactors is particularly useful for the switching of current pulses and for various types of control since moving parts and contacts carrying heavy currents can be excluded to a large extent. In such control schemes there are no "consumable" parts or valves.

A more conventional design of voltage regulator was shown in improved form together with examples of variable transformers. One of the latter, for high-frequency use, can deal with loads of 500 VA and is notable for its small size. For the stabilization of a.c. voltages for accurate laboratory work an equipment is shown having a short-term stability within two parts in 10,000.

A valuable accessory for control purposes is the vacuum switch. Two new magnetically operated models deal respectively with 15 A a.c. or d.c. at 600 V and the same current at 1,500 V, in a time of 10 milliseconds. Other designs of relay, with or without time lag, can be supplied for different schemes of switching.

Miniature Motors

Miniature motors are constantly in demand for servo mechanisms and on various stands ranges of such motors were shown for both a.c. (high and low frequency) and d.c. operation. The need for a more powerful self-starting motor with a torque lying between that of a synchronous clock motor and that of a commercial fractional-horse-power motor now appears to be met. An example was shown which has a torque of 0.75in/oz at 3,000 r.p.m., while its larger prototype produces 6in/oz at the same speed. Other designs with various terminal shaft speeds and torques are also available.

For laboratory and industrial use there were some new portable test instruments, such as a substandard multi-range dynamometer wattmeter with a 6in scale, or a multi-range moving coil rectifier test set for which substandard accuracy was claimed. For low power factor measurements of power a torsion head dynamometer wattmeter was shown. Some types of galvanometers have been redesigned and more elegantly housed, while a very compact twelve-unit, taut suspension reflecting galvanometer bank for photographic recording has been produced.

One novel portable wattmeter solves the problem of making power measurements without breaking the circuit. The split magnetic circuit, mounted on a convenient handle, opens to link round the primary conductor, voltage connection meanwhile being made by means of

shielded clips and a fused lead. The movement, of dynamometer moving-coil pattern, is very small and is housed in a plug-in Bakelite case so that range changing is merely a matter of plugging in a new movement. This neat portable instrument is available in ranges from 50 kW upwards, a plug-in ammeter movement also being available.

New additions to the wide range of insulation testers were seen. One of these, hand operated, has a maximum test pressure of 2,500 V d.c. and six ranges from 50,000 megohms downwards, while another with a test pressure of 5,000 V d.c. has ranges down from 100,000 megohms.

An examination of the exhibits and demonstrations of the various research establishments, sponsored by the Government or private enterprise, provided many suggestions for the shape of things to come. The use of the Hall effect in a germanium crystal is one example. Two prototype equipments were operated to show how accurate measurement of magnetic flux may be made, using a tiny probe only some 3mm square. This must be a boon when investigating complicated or small magnetic circuits. There were also examples of other magnetic measuring devices such as permeameters and magnetometers.

The research demonstrations set the character of this exhibition and the co-operation of all the organizations concerned and their staffs is to be commended. The Royal Technical College, Glasgow, University College, Southampton, and the Cavendish Laboratory, University of Cambridge, were all taking part this year with demonstrations of h.v. measurement, an electronic tachometer and a decade scaler respectively.

A review of this nature cannot really do justice to the wealth of information available at the Physical Society exhibition. No reference has been made, for instance, to the fascinating computers and analysers, the impressive spectrographs and spectrophotometers, the optical instruments and devices, the materials testing equipment, and the many other tools now available and under development for physicists, research engineers and, ultimately, industry.

A co-ordinating exhibition of this nature is vitally important in these days when time, our most valuable commodity, can so easily be wasted in fruitless or repetitive development. It is to be hoped that before anyone in the Services, Government Departments or private industry embarks on a new project, full opportunity will be taken of the available tools and techniques revealed at these annual exhibitions and elsewhere. Only by full co-operation with industry can we hope to save the expense of unnecessary development and multiplication of designs differing only in detail from one another.

Trigonometrical Calculations

A NEW slide rule calculator has just been introduced by Holophane, Ltd., as an aid to the calculation of angles and distances in extended light installations; it can also be used to advantage in many complicated trigonometrical problems.

The principle of the calculator is that scales of distance, sines, cosines and tangents are set out on the front of a 10in slide rule in such a way as to facilitate the solution of such expressions as $\tan \phi = \text{Lsec } \frac{\theta}{H}$ or $\cos a = \cos b \frac{\tan c}{\tan d}$, together with many simpler relations.

The range of the scales covers most practical conditions, the distance range being 1 to 600ft and range of angles from 4 deg to 88 deg; accuracy is better than 0.5 per cent.

The rule is soundly constructed of laminated Bakelite with engraved scales in red and black on a white ground, an adjustable tensioning device being provided for controlling friction of the scale. An instruction book which accompanies each rule sets out the methods of calculation in detail and gives the formulæ relating to the various angles and distances. This "Angle Calculator" is a companion to the "Illumination Calculator" which was produced last year, and is sold at £2 2s.

Scottish Television Scheme

IN extending its television service to cover a wider area the B.B.C. is to build a high-powered television transmitting station at Kirk o'Shotts near Harthill, Scotland, where a site has been chosen and tested. Later on, another lower-powered station will be built in Aberdeenshire. The Kirk o'Shotts station will serve central Scotland and it is hoped that it will be ready for service by about the end of 1951.

M.K.S. Units

Case for the Adoption of the Giorgi System

THE symposium of four papers at the Institution of Electrical Engineers last week began with a contribution from Mr. L. H. A. Carr (Metropolitan-Vickers Electrical Co., Ltd.) which set out the decisions of the International Electrotechnical Commission and then explained the underlying principles of the system,* originally suggested by Professor G. Giorgi in 1901.

The metre - kilogramme - second (M.K.S.) system of units of electrical measurement is not designed to supersede the centimetre-gramme-second (C.G.S.) system. It is an extension of the present set of practical units into a complete absolute system, which embodies mechanical, electrical and magnetic units; it stands on its own fundamental definitions and is intended to replace the mixed practical and C.G.S. units hitherto customarily used by electrical engineers.

The paper contains a list of the principal M.K.S. units, each of which is fully defined. It explains the effect of the special theory of relativity (in accordance with which Ampère's law may be deduced from Coulomb's law) and the resulting simplification of the theory of dimensions.

The adoption of the M.K.S. system should not cause any difficulty in teaching while rationalization (transfer of the factor 4π from one position to another in the basic equations of electromagnetism and electrostatics for definite reasons stated in the paper) is not an inherent part of the system.

In the second paper, Prof. G. H. Rawcliffe (University of Bristol) explains the meaning of the rationalization of electrical units. He differentiates between Heaviside's original suggestion (which would involve a change in the size of the unit of current) and what is now favoured, which does not involve any new units of measurement.

The author considers that a prudent compromise may be to introduce an unrationalized M.K.S. system first and, after its acceptance, to press for rationalization later on. This paper contains a list of rationalized units and constants.

The purpose of the third paper, by Messrs. H. Marriott and A. L. Cullen (University College, London) is first to point out what the rationalization of electromagnetic theory and of the units of measurement involves and, secondly, to advocate its adoption by those institutions in Britain whose example largely standardizes the terminology of electricity and magnetism.

A standardized system of theoretical physical formulæ is not completely practicable; it is possibly undesirable as such, but the authors contend that a standardized system of units is imperatively necessary. When, as in the electromagnetic case, the system of units is conditioned by the system of theoretical formulæ employed to define them, then the formulæ must be standardized as a necessary evil.

In the fourth paper Dr. E. Bradshaw (Manchester College of Technology) outlines a suggested teaching sequence in which the metre, second, ampere and volt are used in the elementary stages to obtain the dimensions and units of other electrical quantities, leaving the more abstract discussion of the subject to a later stage of the educational course. The author favours making both changes at once, thereby introducing the M.K.S. rationalized system.

DISCUSSION

Professor E. W. Marchant said that a simple system of units might save teachers and researchers much time and energy. The great advantage of the M.K.S. system was that the practical units—the ampere, volt, farad and henry—were the absolute units. A further advantage was the distinction between flux density B and magnetizing force H, which some people found it difficult to understand. Lastly, there were only two quantities to remember—μ_0, or free

* *Electrical Review*, 20th Sept., 1940, 26th Dec., 1941, 24th March, 1950.

space permeability, and k_o, or absolute permittivity of medium.

Professor R. O. Kapp said the proposed change of system should not be very upsetting, particularly as the practical units were not affected. The subject was not so profound and difficult as was sometimes supposed. Those chiefly affected by the change would be teachers and writers of textbooks. It was an advantage to be able to teach students not merely to memorize but to understand the "why" of what they were doing and the choice between the rationalized and the unrationalized M.K.S. system really depended on whether one was thinking in terms of fields or in terms of force between charges, which emphasized that the choice was psychological and not really scientific at all. His own choice would be for the rationalized system.

Dr. L. Hartshorn was in favour of the M.K.S. system, though it was asking a good deal of electrical engineers to expect them to change the habits of a lifetime. The other systems should be allowed to fade away and he was not in favour of tolerating them—as some people had suggested—side by side with the new system. The last thing one desired was to burden electrical science, students in particular, with yet another system of units. The chief advantages of the M.K.S. system were simplicity, ease of remembering, familiarity of the units, familiarity of approach and practical convenience.

Students and Examiners

Prof. M. G. Say said he had been teaching the M.K.S. system for some years and students found it attractive. He had heard no arguments against its adoption for engineering use. It offered little that was unfamiliar, except the weber (volt-sec, magnetic flux) and the newton (force), and its units were practical. The system of analogies mentioned by Mr. Cullen and the teaching development outlined by Dr. Bradshaw were educationally attractive. One difficulty might be that reactionary examiners might persist in using C.G.S. whereas students would be taught in other systems. The difficulty was aggravated by the lack of suitable textbooks in this country as compared with America.

Dr. H. Pelzer, speaking on behalf of himself and Dr. Whitehead, said the main merit of the system was that it contained four fundamental units in place of three, which made the absolute system equivalent to the existing series of international practical electrical units. Many textbooks were written in other systems, however, and some help should be given to those who had to use more than one system. He outlined how this help could be given.

Mr. R. J. Halsey said he hoped the C.G.S. system would rapidly fade out, as the early M.G.S. system had done, leaving the M.K.S. system alone. It was extremely logical and was suitable to electrical engineering. There were one or two awkward points, and he did not know how teachers would get on when they had to define the unit of force. Some adjustment of ideas would be essential. However, he did not see how the practical engineer could resist its appeal. He favoured the rationalized form.

General Approval

Mr. G. F. Freeman thought no-one could fail to be struck by the general attitude of approval for the M.K.S. system. He hoped it was reflected in the country outside. In his own experience very few examiners made use of it and it might be well for the Institution to give some sort of directive both to examiners and to those who compiled examination syllabuses, so that teachers would be warned to take the necessary steps. While simplification was desirable the short-term effect would be difficult, particularly for National Certificate students. The choice between rationalized and unrationalized units would depend in the main upon the particular field in which the person concerned was working and here there might be practical difficulties.

Prof. Emrys Williams said he was on the side of the rationalized M.K.S. system but, even if the student knew all that was said about rationalization in the four papers, he could still find himself in difficulties because of the distinction between what he might call complete equations valid for all units and incomplete ones valid only for particular units.

Prof. G. F. Nicholson said he agreed with the convincing arguments in favour of the inevitability of the rationalized M.K.S. system. Its main beauty was psychological and educational. It produced very clear and significant forms of equation, strengthened by the very natural units involved. In introducing the system one must consider the man tackling the subject for the first time; the psychologically easy method of approach was *via* the mechanical concepts with which he was familiar and a new quantity, the electric charge. For the sake of posterity he hoped the Institution would come down unequivocally in favour of the rationalized M.K.S. "coil" system of units.

Mr. W. Grant, speaking as an industrial engineer, said he was a convert to the M.K.S. system, but he thought the unrationalized system should be called "polar" and the rationalized "plane" for easy recognition.

Mr. C. T. Baldwin confessed to some doubt as to the method of introducing the

M.K.S. system. The suggestion that the approach should be gradual did not appeal to him. It would be more satisfactory, he thought, if teachers, at any rate, continued with the present system and gave students a thorough grounding in the present system of units. If this were done properly and the M.K.S. system were eventually adopted, there should be no difficulty in changing over. Any move towards a change should be taken slowly until such time as a complete change over could be made. Electrical theory was affected by both the change to M.K.S. and the change from unrationalized to rationalized, so there should be only one upheaval and not two.

Mr. A. Draper thought teachers of electrical science would be grateful to the authors. Personally, he agreed that the adoption of the M.K.S. system should raise no difficulty in teaching—rather the reverse. At the college with which he was associated the change had been made three years ago and practical experience in the classroom had shown that the step was well justified. His only regret was that they had started with the unrationalized instead of the rationalized system. Admittedly the change over to the M.K.S. system was not easy and involved considerable recasting of lecture notes and remoulding of numerical examples, but the results repaid the effort. The few fundamental equations required were sufficient to take students a long way.

The authors briefly replied to the discussion, Prof. G. H. Rawcliffe pointing out that he thought every electrical engineering professor in the country had adopted the system. The physicists, however, contrary to the American physicists, would not listen. He hoped any who had physicists among their acquaintances would carry the gospel to them. The whole thing must start, however, with the schools and the physicists and, not being a teacher, it was not for him to say how that should be done.

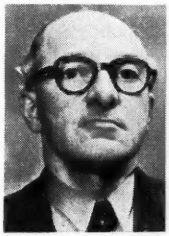
ELECTRIC LIGHT FITTINGS

Association's Annual Report and Luncheon

RISING costs have been a serious problem to members of the Electric Light Fittings Association during 1949, and consequent upon devaluation of sterling the problem has become even more acute. By efficiency in production, standardization and economical distribution it has been possible to stave off any general advance in prices during the year, but it is stated in the annual report for 1949 that any further increase in costs must make some advance inevitable. Sales for the home trade of electric light fittings showed the usual seasonal fluctuations, but the summer level of business during 1949 was higher than in the corresponding period of 1948.

The Association is collaborating in regard to the illumination of the various centres of the Festival of Britain in 1951 and in regard to the exhibits of electric lighting fittings. An E.L.F.A. panel has been set up with the approval of the Festival authorities to review any lighting fittings selected tentatively by the Festival officials for exhibition and another panel has been appointed to advise on general questions of illumination. Close contact has been maintained with kindred trade associations and with the Electrical Fair Trading Council. The Association also acknowledges the help and co-operation received during the war from many Government Departments.

The total membership of the Association at the end of the year was forty-seven, of



Mr. F. W. Norris, retiring president, and (right) Mr. K. Scott Adie, who succeeds him

which six were associate members. Section membership at the end of the year was as follows: Decorative and Commercial Fittings Section 39; Industrial Fittings Section 36; Street Lighting Fittings Section 18.

Dealing with the various sections, the report states that the continued operation of price control orders during the first half of the year prevented the introduction of a reduced basic trade discount and certain other revisions of the Decorative and Commercial Fittings Section's trading policy. The withdrawal of price control orders on lighting fittings at the end of July enabled work to begin on plans for the revised discount structure. Plans were developed in the latter part of the year to introduce a new detailed trading code for the section

incorporating a basic trade discount of 25 per cent instead of 33⅓ per cent, as at present. The basic discount structure has already been agreed with the associations representing the distributors and with the Electrical Fair Trading Council. The revised discounts permit lower retail prices for the benefit of the consumer than would otherwise be possible and the detailed provisions of the trading code helped to ensure fair trading for the benefit of all concerned. It is hoped to complete this work shortly, and introduce the new trading code in the early part of 1950. Purchase tax continues to restrict the sales of lighting fittings.

The trading code of the Industrial Fittings Section based on the Fair Trading Policy was further extended and clarified, and the Street Lighting Section trading code has been extended and amended from time to time to meet changing conditions. Closer collaboration with the street lighting column manufacturers was a feature of the policy.

Annual Luncheon

The annual meeting was preceded on Wednesday last week by the annual luncheon, which was held at the Trocadero Restaurant, London, Mr. F. W. Norris, president, being in the chair.

In proposing the toast of the guests, Mr. Norris said that this was the first year that they had gone outside the family circle, and the guests present embraced the electrical contractors, represented by Mr. S. Dickinson (president of the E.C.A.) and Mr. L. C. Penwill (director and secretary); the electrical wholesalers, represented by Mr. J. M. Hollander (president of the E.W.F.) and Mr. A. B. Wildsmith (director and secretary); the Electrical Fair Trading Council, represented by Mr. V. Watlington and Mr. A. S. Lowe; and the E.L.M.A. and E.D.L.A.C., represented by Mr. W. J. Jones and Mr. A. E. Hickman, respectively. The Association dated back to 1936, and they got a real sense of satisfaction when they saw the fruition of their efforts in good lighting for all kinds of installations. They hoped the day would never come when a man ceased to take pride in craftsmanship.

Mr. Hollander, in replying to the toast, said that the organizations represented at the lunch comprised the four-fold structure of their industry, including as they did manufacturers, wholesalers, contractors and the Fair Trading Council. These organizations should enable them to stand up to nationalized industry, monopolies and controls, and in spite of any differences it was important to present a united front, as by so doing they could meet the disruptive forces which tended to overthrow the work of many years. Mr. S. Dickinson also referred to the damage caused by frustration and control which could impede progress, and said that the answer was unity of action and purpose.

Mr. K. Scott Adie proposed the toast of the past presidents and welcomed the presence of Mr. J. N. Stephens, the first president of the Association, Mr. F. Winstanley, president for 1932-33, and the other past-presidents. Mr. F. Winstanley, in reply, spoke of the problems which first brought the lighting fittings manufacturers together into an Association which, he said, was now respected throughout the industry.

At the annual meeting of the Association, Mr. K. Scott Adie was elected president for the ensuing year.

New Lamps

MEMBERS of the Electric Lamp Manufacturers' Association have announced the introduction of three new types of lamp. The first is a tungsten filament lamp with an internal coating of silica which gives greater diffusion than the "pearl" type with only a slight increase in light absorption. It is designed to take the place of the opal lamp which has not been available for some years owing to glassmaking difficulties. At present the new lamp is being made only in the 100 W size for 200-260 V; the price is 2s, plus 7d purchase tax.

A new fluorescent lamp is the "mellow" 4ft 40 W tube, available at 14s plus 3s 8d purchase tax.

Four coloured fluorescent 5ft 80 W lamps are now obtainable—red, yellow, blue and green. These can be used in standard fittings and cost 20s each, plus 5s 3d purchase tax. They are very suitable for decorative purposes in single colours or in combination, providing ample illumination with low intrinsic brilliance.

Australian Electrical Trade

DURING the 12 months ending June last imports into Australia of electrical machinery and appliances were valued at £A17,212,000, compared with £A10,308,000 in 1947-1948. The principal items are shown below:—

Class of Goods	1947-48	1948-49
Batteries and accumulators ...	107	160
Cable and wire, covd.	1,813	3,981
Dynamo-elec. machines ...	2,232	3,866
Lamps, filament, for lighting and heating	425	535
Telegraph and telephone instruments, etc.	1,385	3,533
Other	4,346	5,137

Exports of electrical appliances and equipment during the twelve months were valued at £A1,579,000, against £A1,113,000 in 1947-1948.

Commerce and Industry

Engineers' Strike Ballot
Holme Moss Station Contract

LAST week the Ministry of Labour and National Service requested the Confederation of Shipbuilding and Engineering Unions to defer the ballot which it proposes to take to ascertain whether members wish to strike in support of their claim for £1 a week increase in wages. The Ministry said that the form of the ballot appeared to raise issues under the Conditions of Employment and National Arbitration Orders which require a dispute to be reported to the Minister and a period of 21 days to elapse before strike action is taken. A meeting was held on Monday last between representatives of the Ministry and the Confederation to discuss the situation.

Minister at E.D.A. Luncheon

The Minister of Fuel and Power, Mr. P. J. Noel-Baker, M.P., has accepted the invitation of the British Electrical Development Association to be the principal guest and propose the toast "Electrical Development" at the Association's annual luncheon on Friday, 21st April.

Trade with Indonesia

The Secretary for Overseas Trade (Mr. A. G. Bottomley) announced on 29th March the conclusion of trade talks in London between United Kingdom Government officials and representatives of the Government of the United States of Indonesia under the leadership of Dr. R. R. A. Asmaun, Chargé d'Affaires for Foreign Economic Relations in Europe of the Indonesian Government. Indonesia's imports from the United Kingdom during 1950 will continue to be limited owing to Indonesia's balance of payments difficulties, but quotas will be made available for U.K. exports up to a total value of over £7 million. The principal items include machinery and electrical equipment. The Indonesian Delegation has emphasized that it is important that the prices of United Kingdom goods should be fully competitive with those of other countries, having regard to their quality.

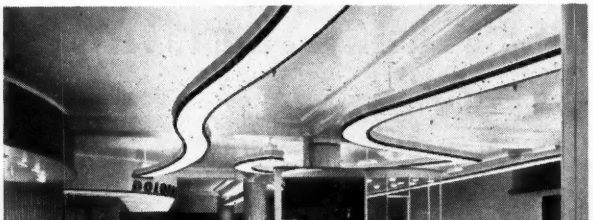
Holme Moss Television Station

The B.B.C. announces that the contract for the building work for the new television station at Holme Moss, near Huddersfield, has been awarded to John Laing & Son, Ltd., of Mill Hill, London. The 35 kW vision transmitter, 12 kW sound transmitter, aerial and aerial feeder system are being manufactured by Marconi's Wireless Telegraph Co., Ltd. A 750ft mast similar to that at Sutton Coldfield will be supplied and erected by British Insulated Callender's Cables, Ltd. It is hoped that this station will be completed by the middle of 1951.

Princess Margaret at Salford

On Monday, 27th March, during a four-day visit to Lancashire, Princess Margaret visited the works of Salford Electrical Instruments, Ltd., a subsidiary of the General

Princess Margaret at the works of Salford Electrical Instruments Left to right: Earl Peel (Lord Lieutenant of Lancashire), the Hon. Mrs. Gamage, the Mayoress of Salford, Recorder of Salford, H.R.H. Princess Margaret, Mr. H. Cobden-Turner and the Mayor of Salford.



The first-floor salon at the Leicester Square "Dolcis" store

Also on the ground floor is the "man's shop," which is specially treated in a more masculine manner. Behind this is the control board in which all the micro-gap lighting switches and fuses are concentrated, making a very compact arrangement.

The first floor is reached by a staircase lighted the full length of one side by cold-cathode tubes concealed in an inverted trough with transverse louvres over a series of showcases.

The same system is employed below the ceiling of the salon on the first floor, in which are displayed not only shoes but many other articles of feminine wear, with local spot-lighting where necessary. A separate counter is lighted by a canopy housing cold-cathode tubes and spotlights concealed behind "egg-crate" louvres.

Altogether there is about 30 kW of lighting of which the display windows take about half.

Electric Co., Ltd. Her Royal Highness was received by Mr. H. Cobden-Turner (managing director of Salford Electrical Instruments, Ltd.) and Mrs. Cobden-Turner, and on behalf of the General Electric Co., Ltd., by Mr. Leslie Gamage and the Hon. Mrs. Gamage.

During her tour of the works the Princess was shown a selection of radio equipment, telephone loading coils, toroidal coil winding equipment and some of the company's wide range of indicating instruments. She displayed particular interest in the manufacture of synthetic sapphires especially those suitable for use in jewellery. She also spent some time in the electronics laboratory.

Shoe Store Lighting

It is intended that the Leicester Square, London, "Dolcis" establishment shall be the forerunner of a number of other stores of its type, and particular attention has, therefore, been paid to its lighting. The efficient and pleasurable results secured there have emerged from the close collaboration of the staff architect of Upsons, Ltd. (Mr. E. E. Somake) and Courtney, Pope (Electrical), Ltd., who have carried out the installation.

On the ground floor the island window displays are illuminated by a combination of fluorescent tubing in the front of the ceiling assisted by recessed tungsten lamps which temper the lighting and pick out the items in the display. In the entrance hall is a recessed ceiling with concealed tubing which is designed to "direct" customers to the first floor. There is a display of single items lighted by tungsten lamps behind louvred panels.

Fair Trading Council

The offices of the Electrical Fair Trading Council have been removed to Sardinia House, Kingsway, London, W.C.2 (telephone: Holborn 4538).

Batti-Wallahs' Society

Some of the problems which faced the British Forces in Berlin during the Berlin crisis were referred to by Major-General E. O. Herbert at last week's luncheon of the Batti-Wallahs' Society. Major-General Herbert, who is now Director of the Territorial Army, was commander of the British Forces in Berlin during that critical period, a position which called for supreme tact and organizing and administrative ability. He mentioned that one of the major problems was the maintenance of an electricity supply upon which the economic life of the city depended. The whole of the coal supplies had to be brought into the city by air. The Berlin West power station, the only modern station which had not been badly damaged during the war, had been stripped of its plant by the Russians in 1945, and much of the electricity supplies had to be "imported" into the city through the grid. In addition to these difficulties the switching

arrangements in the city did not always follow the boundary between the British and Russian sectors and certain areas in the British zone were liable to be cut off without warning. Supplies had to be reduced by two-thirds and a stringent rationing system had to be enforced. With the supply of coal for domestic purposes also drastically reduced, the people of Berlin had to endure considerable hardship. Maj.-Gen. Herbert concluded his talk with a reference to the new scheme for a National Army.

The new Birmingham showroom of Simpson Baker & Co., Ltd.

Rectifier Equipment for Canada

The importance of exports to the dollar countries lends special interest to the rectifier equipment now being built by the General Electric Co., Ltd., for the City of Edmonton, Alberta, Canada. The contract, valued at $20,000, includes a 1,700 kW, 575 V rectifier with its associated transformer for converting the 13,800 V, 60 cycle supply to d.c. The rectifier is of the company's standard pumpless air-cooled steel tank design, and comprises three cylinders, each housed in its own sheet-steel cubicle.

New Birmingham Showroom

The new showroom of Simpson, Baker & Co., Ltd., electrical wholesalers, at Hockley Street and Unett Street, Birmingham, have now been opened. The showroom is spacious and tastefully decorated and displays a wide range of electrical gear and accessories, domestic appliances, lighting fittings and radio and television receivers. A section of the showroom is shown in the accompanying picture.

Aluminium Nomenclature

The publication of specifications for aluminium and its alloys for general engineering purposes by the British Standards Institution is bringing within one system of nomenclature both cast and wrought metals which have hitherto been differently designated, such as the B.S. and D.T.D. series and the Services Schedule (BS/STA7).

A chart has now been prepared by the Aluminium Development Association which relates in a simple way the new system of naming these metals with those that it replaces, indicates their classification with related specification numbers and approximate composition of each. The chart is designed for wall mounting; it will assist identification and should help to bring the new nomenclature into early use.

An English Electric display of domestic electrical apparatus at the Western Australian Government London offices in the Strand

Domestic Appliances Display

The English Electric Co., Ltd., exports a considerable quantity of domestic electrical appliances to Western Australia and to illustrate some of the equipment supplied by the company a special display has been shown in recent weeks in the window of the Western Australian Government office in the Strand, London, W.C.2.

Third Sea Lord at Rugby

On 29th March a tour of the B.T.H. Rugby Works was made by Vice-Admiral N. M. Denny, Third Sea Lord and Controller of the Navy. He was accompanied by Mr. H. D. MacLaren, Director of Electrical Engineering, Admiralty, and by Mr. J. C. Thompson, Assistant Director of Electrical Engineering, Admiralty. The visitors were welcomed by Mr. E. H. Ball, managing director of the British Thomson-Houston Co., Mr. L. J. Davies (director of research and education), Mr. H. Jack (director and chief electrical engineer), Mr. H. L. Satchell (director, and manager Rugby Works), Mr. W. W. Vinsen (director of manufacture), Mr. E. S. Little (secretary and comptroller) and Mr. W. S. Steel (manager, home sales).

Contract Price Adjustment Formulæ

The following are the latest figures for use in the B.E.A.M.A. contract price adjustment formulæ. The rate of pay for adult male labour at 11th March is deemed to be 115s (unchanged). Costs of materials: the Board of Trade index figure for intermediate products as on 11th March is 277.3 and is the figure for February (against 277.0 for January).

Trade Announcements

The address of **Powerlite Electrical Installations, Ltd.**, is now 84, Buckingham Gate, Westminster, London, S.W.1.

The Power Centre Co., Ltd., has opened a London office at Wellington House, 125/30, Strand, London, W.C.2 (Telephone: Temple Bar 1743), under the management of its technical engineer, Mr. E. K. Guy.

B.E.A. Clerical Grades

An agreement has been reached governing the salaries and conditions of Clerical and Administrative employees of the British Electricity Authority and the Electricity Boards. It is operative from 1st April, and covers general clerical grades, shorthand and typing grades, machine operators (accountancy, addressing, etc.), private secretaries, higher clerical, administrative and commercial staff (Area, Sub-Area and District), demonstrators and housecraft advisers. Normally a week of 38 hours is provided for, except for "staff who are allocated to other hours as a condition of employment," and provision is made for the preservation of personal rights under existing contracts of service.

Thus for the first time national scales will apply to administrative and clerical posts in the industry. Because of variations in size, number of consumers and administrative organizations of the Area Boards, it has been necessary to allow considerable flexibility, but the scheme indicates scales which should apply to certain posts so that a common standard can be evolved. It is proposed to review the scheme in a year's time in the light of experience of its operation.

Meter Approval

Ferranti, Ltd., announce that their new "FM" meter has been approved by the Ministry of Fuel and Power for certification in accordance with the Electricity Supply (Meters) Act, 1936.

Educational

The Imperial College of Science and Technology will shortly elect a number of English Electric Co. bursars in hydro-power engineering. Particulars are given in our advertisement pages.

The governing body of the Municipal College of Technology, Manchester, is offering six scholarships and six exhibitions to part-time students and others, tenable in any one of the full-time day courses of the Municipal College for three academic years. Particulars of these and of the Lewis Atkinson Entrance Scholarship in Electrical Engineering can be obtained from the Registrar of the College.

Catalogues and Lists

Chamberlain Industries, Ltd., Staffa Works, Staffa Road, London, E.10.—Leaflet on a 50-ton motorized hydraulic horizontal bending machine, and another concerning a 3-in capacity open type hydraulic bending machine.

Griffin & Tatlock, Ltd., Kemble Street, Kingsway, London, W.C.2. — Technical folder (GT1386) dealing with "Microid" polishing aluminas.

Doran Instrument Co., Ltd., Stroud, Glos.—Two technical leaflets, No. 106 on a precision general-purpose potentiometer, and No. 107 on a thermocouple potentiometer.

Allen West & Co., Ltd., Brighton, 7.—Illustrated catalogue (No. 1740) showing the wide range of the company's products for industrial, marine and traction services.

HOUSECRAFT ADVISERS

E.D.A.-E.A.W. Conference in London

SOME 300 delegates from all over the country attended the annual conference of electrical housecraft advisers, senior demonstrators and senior showroom assistants arranged by the British Electrical Development Association and the Electrical Association for Women, and held in London last week. The conference extended over four days and covered many aspects of domestic electrification.

The official opening was performed by Sir Henry Self, and was followed by a talk by Lionel Hale on "Respect for the English Language." The afternoon of the first day was spent at the Ideal Home Exhibition, where, of course, the main attraction was the E.D.A. stand. Wednesday's proceedings included a lecture by Mr. J. I. Bernard on the post-war cooker in which he dealt with the design and performance of domestic and heavy-duty cookers. Miss E. Gwillim (Caroline Haslett Trust Travelling Exhibition, 1949) gave a talk on electrification in Holland, following her visit to that country.

On Thursday, Miss Joan Whitgift (housecraft adviser, Simplex Electric Co., Ltd.), spoke on the capabilities and limitations of the various types of domestic washing machines, and this was followed by a talk by Mrs. E. A. Windsor (London Electricity Board) on the use of washing machines in communal laundries. The afternoon was taken up with the showing of a number of E.D.A. films.

On the final day Miss Marjorie Gordon (first holder of the Caroline Haslett Trust Exhibition for Teachers) lectured on "Teaching Electricity in American Girls' Schools," while Mrs. Frank Forrest concluded the proceedings with a talk on "The Art of Public Speaking."

The conference luncheon was, as usual, quite informal and Mr. V. W. Dale in a brief speech welcomed the presence of Mr. R. Turlin, Director of A.P.E.L., the French counterpart of E.D.A., Mr. Read, of Nairobi, and Mr. P. Harben, the B.B.C. lecturer on cooking. He hoped that the delegates would have learned much during the conference which would prove valuable in their work of instruction in electrical housecraft when they returned to their areas. The electricity supply industry had much ground to make up following the war, but the Area Boards were fully alive to the importance of the domestic load and he hoped the position would be brighter when they met again next year.

Following the luncheon the delegates visited the E.A.W. headquarters at 35, Grosvenor Place, S.W.1.

Status and Service Conditions

THE cordial relationship now existing between the Association of Electrical Housecraft Advisers and the B.E.A. and Electricity Boards was very apparent at the Association's third annual dinner, held at the Charing Cross Hotel on 29th March. Dame Caroline Haslett, president, was in the chair, and introduced the speakers. The first of these was Miss M. Gordon, B.Sc., of Cheltenham Ladies' College, who was the first teacher to be awarded a Caroline Haslett travelling scholarship. Miss Gordon, in proposing the toast of "The British Electricity Authority," referred to her visit to the United States, and expressed thanks to the B.E.A. for the assistance it afforded to teachers. Friendliness and help, she said, were the keynote of its service.

Mr. E. W. Bussey (B.E.A.), responding, said that the Central Authority was a much-maligned body, but it was succeeding in its aim of moulding the industry into one homogeneous organization, largely because of the co-operation and good fellowship of all concerned. Referring to "labour relations," he said that electrical housecraft advisers were now included in a new agreement under which they had a definite scale and conditions of service. This would raise their status and attract new entrants. Agreement had also been arrived at with the manual, technical and clerical workers; the managerial and executive grades remained to be dealt with.

The toast of the Association was proposed in a witty speech by Mr. H. J. Randall (chairman, London Electricity Board). He maintained that the current E.D.A./E.A.W. conference was designed to secure the ascendancy of women in the industry! The housecraft advisers were "front-line" troops; he had seen them in action in the service centres in his Area, and was impressed by the way they were doing their work. During the past few years they had had to adopt a more or less negative attitude towards electrical development, but now they could be more positive. They would play an increasingly important part

in a progressive industry with infinite possibilities.

Dame Caroline Haslett, in her reply to the toast, expressed her appreciation of the way in which her men colleagues in the B.E.A. treated her on level terms. She paid a tribute to those responsible for the success of the Association, mentioning particularly Miss Gosse, Mrs. Pavitt and Miss Wyld. The organization was necessary to the housecraft advisers as a means of clarifying their minds. A big world was opening up before them, and if they prepared themselves for it they would be able to take part in dealing with the bigger issues of the industry.

Miss Joan Whitgift proposed the health of the guests. She said the Association was a trade union but, contrary to the general idea, its aim was not to see that its members did as little work as possible. The housecraft advisers were highly qualified and aimed at being a profession in their own right—not merely an adjunct to an industry.

Mr. E. R. Wilkinson (commercial manager, B.E.A.) responded in the unavoidable absence of Miss D. E. Blackmore, senior inspector of housecraft, L.C.C. and praised the housecraft advisers for their keenness and wished them success in their good work. He expressed concern at the progress being made by gas cooking at the expense of electricity, saying that the gas industry was disposing of three or four times as many cookers as the electrical industry, although there was an overwhelming preference for electricity among new householders. It should be the first task of electrical housecraft advisers to bring about a change in this position.

INDUSTRIAL CONTROL

New S.I.T. Section Formed

DISCUSSIONS which have recently taken place between the Inter-Services Panel on Servo Mechanisms and the Society of Instrument Technology culminated in the inauguration of a Control Section of the Society at a meeting held last week at the Royal Society of Tropical Medicine in London.

The meeting was noteworthy for the large attendance, the brief interesting addresses which were given, and the vigorous discussion which followed. Mr. D. A. Oliver, president of the S.I.T., who took the chair, outlined the events leading to the meeting and pointed out that the fundamentals of control were common to all branches of engineering and involved also mathematicians, physiologists and psychologists. Thus, no single one of the older institutions or scientific societies could provide a suitable forum for the discussion of this important aspect of modern industrial progress.

In the opening talk Prof. K. A. Hayes mentioned the historical background of the Services' approach to the problem of control and showed how much work had been done, particularly on "nomenclature" which is already covered in part by a B.S. Specification.

He was followed by Dr. A. Utley who, delving briefly and simply into the mathematics of closed loop servo systems, also explained the fundamental equations connecting force applied to force produced; the balance of these forces; and damping of the system.

Professor A. Tustin then introduced some practical problems and suggested several types of mechanisms which could be further investigated with a view to providing the power amplification required for automatic control schemes.

The discussion, opened by Brigadier Hinds, brought many interesting comments from a large number of speakers, who mentioned the requirements of the chemical engineer, the steel smelter and the research physicist, both as to control equipment and the fields in which this new section of the Society might work. Emphasis was also laid upon the study of the human operator in control schemes, where a great deal of work remains to be done.

It is proposed that a proportion of the meetings of the S.I.T., both in London and the provinces, shall be set aside for this new Control Section and it is evident that there will be no lack of interest in its transactions.

Isotopes in Industry

THE Department of Extra-Mural Studies of the University of Birmingham, in conjunction with the Birmingham Branch of the Atomic Scientists' Association, is to hold a conference on "Isotopes in Industry" from 19th to 21st May at the University. The conference is designed to introduce radioactive isotopes and the associated techniques to industrial scientists and technologists. Further details can be obtained from the Department of Extra-Mural Studies, University of Birmingham, Edmund Street, Birmingham, 3.

ELECTRICITY SUPPLY

Financing Uganda Scheme
Yorkshire Rural Electrification

ON 21st March the Uganda Legislative Council approved a proposal to borrow £13,000,000 for the Owen Falls hydro-electric development. Short-term loans will be limited to £2,000,000. The Council also approved an advance account of £1,500,000 to finance a cement factory to be erected about 90 miles from the site of the dam.

Further Rebates

The North Western Electricity Board has announced that tariffs which were affected by the Clow surcharge in 1948-49 are to be subject to a rebate of 0.18d per kWh for one quarterly period following the first meter readings after 14th April.

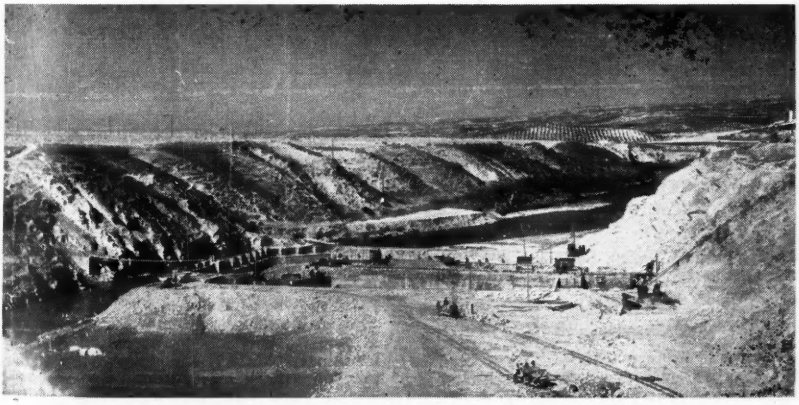
In the East Midlands Area, the chairman of the Board (Mr. C. R. King) has informed the Consultative Council that the final rebate will probably be in the region of 0.15d per kWh for a period of three months immediately following the meter readings at the end of the March quarter.

On Monday last the London Electricity Board announced that a further rebate of 0.18d per kWh would be given for electricity supplied under certain domestic tariffs. This final rebate would be made during the second quarterly period of the year, the accounts for which would be issued between now and July. It more than redeemed the promise that the original winter surcharge in 1948-49, after allowing for the three subsequent quarterly rebates, would not be used to provide additional revenue for the Board.

Village Supplies

Several villages in the area of the Yorkshire Electricity Board last week received a supply for the first time. On Wednesday, Lord Heneage performed the official switching-on at Hainton, Lincs. The villages of South Willingham, Benniworth and Hainton have been dealt with as one scheme, the number of premises being 120. Some 4.4 miles of 11 kV cable and line have been laid or erected, with a similar length of l.v. mains.

On Thursday there were three ceremonies, the first at Ledsham, Yorks, being performed by Mr. R. Arundel, chairman of the Parish Council. For this village 1.25 miles of 11 kV line and 0.7 mile of l.v. mains were provided. Applications for a supply were received from all the 38 premises. The next



Work in progress on the Pedro Marin dam, one of the projects now in hand for harnessing the Guadalquivir River in Spain. This scheme, which was started in October, 1948, with a labour force varying between 250 and 500, will provide additional power for Seville, 200 miles away

inauguration, at Cowthorpe, in the area of the Wetherby R.D.C., was carried out by Mr. H. Kendall. The approval of the Minister of Town and Country Planning was granted at the end of January, and the whole work (11 kV line, 1.25 miles; l.v. mains, 0.5 mile) has been carried out in only eight weeks. The number of premises is 28, and to date 23 applications have been received. Finally, Councillor J. W. Holland switched on the supply at Ringinglow, which, although within the Sheffield area, is remote from the populous parts of the city. Details of the extension are: Premises, 39; applications, 38; 11 kV line and cable, 1.9 miles; l.v. mains, 0.3 mile.

European Power Exchanges

In an article published recently in *Mondo Aperto* (Rome), Signor Carlo Ciriello, director of the Research Department of the Edison Group, Milan, deals with exchanges of power within the framework of European Economic Co-operation. Examining the technical and economic aspects of a European super-grid, he contends that the technical advantages are not balanced by the enormous financial and economic sacrifices involved.

Emergency Repair Service

The Merseyside and North Wales Electricity Board announces the institution, on 3rd April, of a 24-hour service for dealing with electrical faults on consumers' premises. The charges, details of which were given in our issue of 10th March last, apply only to such temporary measures as are necessary to ensure the safety of the supply, such as renewing fuses or isolating faulty apparatus.

Terms Accepted

The Hartlepool Town Council has accepted the North Eastern Electricity Board's terms for supplying electricity to 373 houses to be built in Hart Road. These are that the Council should at its own expense provide suitable cable ducts for road crossings and ducts into the houses to provide easy access, withhold work on the permanent laying of footpaths until the Board's cables have been laid and provide a substation site at a nominal rental. Several other local authorities have objected to similar terms proposed by the Board.

horeham Inquiry

A public inquiry which was expected to last from three to five days, but entered its second week, has been in progress at Shoreham. It has arisen out of proposals for the enlargement of the harbour to meet the needs of the new Southwick "B" power station and has been concerned with the sewage disposal arrangements. The full scheme for sewage disposal suggested by the B.E.A. would involve an expenditure of £477,000, which, the chairman of the Southwick U.D.C. complained, came on top of the loss his Council has suffered under electricity nationalization. Before, they had received £48,000 from the old power station, with rates at 13s 2d; now the rates were 16s and they got a £9,000 grant-in-aid which would fall by 10 per cent a year down to nothing.

Assisted Wiring

At the seventh meeting of the East Midlands Electricity Consultative Council held at Nottingham, on 29th March, details were given regarding an assisted wiring scheme (credit sales) which the East Midlands Board was to bring into operation on 1st April. The scheme is designed to assist occupiers of small houses to wire their premises, but owing to the restrictions on capital expenditure it will be confined for the present to properties on the route of new medium voltage rural mains extensions, and to properties on the route of existing rural mains.

Helping Consumers

After giving consideration to a memorandum regarding help given to consumers to enable them to make the best use of their electrical appliances, the East Midlands Consultative Council decided to forward this document to the Area Board for its observations. The Council was of the opinion that many excellent practices available to consumers in some municipal and urban areas should be adopted as a basis of consumer service throughout the Area.

Lighting Restrictions Suspended

The Ministry of Fuel and Power has issued a reminder that all restrictions on the use of electricity for shop window, advertisement and other lighting are removed as from 1st April until 9th October.

Electrical Exhibitions

An electrical exhibition at Guiseley (14th to 18th March) was the first of its kind to be held there by the Yorkshire Electricity Board or its predecessors, and consisted primarily of domestic appliances, although some commercial refrigerators were shown. Demonstrations of cooking and washing machines, which were held daily, commanded a very reasonable attendance, and a considerable amount of equipment was sold. The exhibition was followed by one at Castleford (21st-25th March). After the opening ceremony there was a film show.

Power System Investigation

Operating Experience with a British Analyser

BEFORE designing in detail the individual items of equipment of which a power network, or even part of one, is to be composed, it has always been necessary to make at least some analysis of the system's probable performance. Such analysis has become increasingly important as the complexity of systems has grown, particularly in the interests of economy and technical adequacy. It has long been the practice in America to test the soundness of projected schemes upon circuit models, but elsewhere, where reliance has been placed mainly upon analytical methods, it has often been impossible to make comprehensive studies without a prohibitive amount of work.

The various kinds of analysis which may be needed and the methods of solution available are briefly reviewed in the first part of a paper which Mr. G. Lyon (Associated Electrical Industries, Ltd.) read before the Supply Section of the Institution of Electrical Engineers in London last week. The main body of the paper, however, contains a description of a modern British a.c. network analyser, which may be regarded as typical of the present state of development of such apparatus, and also a discussion of some examples of studies made with its aid.

Design and Operation

The analyser comprises the usual assembly of passive network elements, power sources and interconnecting means in sheet-steel cubicles and works at a frequency of 500 c/s with nominal current of 50 mA and voltage 50 V. After describing the design features of the equipment, Mr. Lyon explains how it is used for load stability and fault studies, making reference in each case to investigations carried out on systems in various parts of the world. The results obtained on an artificial system are then discussed at length, and after setting down the data required for the solution of system problems the author explains in detail the procedure for network analyser studies.

Two years' experience of this analyser has confirmed the author's view that it is indispensable in the planning of power systems, although it is not a substitute for knowledge and experience. A working model system also has educational value as all kinds of experiments can be made, which it would be unwise to try on an actual system.

DISCUSSION

From what was said during the discussion it seems that the a.c. analyser can, if used correctly, be an invaluable aid in the planning of power systems, but care must be taken with assumptions, which might become so familiar as to lead ultimately to error. Several speakers indicated that the use of the board would have saved them a lot of time in many instances, but others felt that the less expensive d.c. boards and modern methods of direct calculation could still be used to advantage in quite a few cases. It was suggested that one recently developed method of calculation could be used effectively as a means of reserving the board for problems which could not otherwise be solved.

An interesting instrument for use in conjunction with the analyser was also described by a speaker. When making fault studies it is often necessary to add up an enormous number of vectors, a most laborious procedure. The instrument in question performs this task automatically and in a very short time.

The analyser which is being built by the E.R.A. was also mentioned. It will work at a frequency of 1.6 kc/s with low voltage and current bases, which makes it possible to employ communication type components. Further developments on the electronic side will permit this board to work over a frequency range of 100:1 so that it can be used for steady state, transient, harmonic and multi-frequency problems.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Mather & Platt, Ltd., held their annual meeting on 30th March, when Mr. L. E. Mather (chairman), who presided, said they had completed fifty years as a public limited liability company and nearly 150 years as engineers in Salford and Manchester. The improved materials position enabled them to offer shorter delivery periods which was valuable under the changed condition now operating, particularly in those markets overseas where competition was much keener than it had been for some years past. In the export field their sales had risen consistently during the last five years. Much of this was in hard-currency and dollar-saving countries. In South Africa they were extending their interests by the formation of a subsidiary company there.

Clarke, Chapman & Co., Ltd.—In the course of his speech at the annual meeting held on 24th March, Mr. J. B. Woodeson (chairman) said that their order book was satisfactory and stood at a figure of over £11,000,000. A fair proportion of this was export work and some for the dollar areas. They had registered subsidiaries in India and Australia. Their output of electrical deck machinery was satisfactory and their boiler department was busier than ever and new orders included several large contracts for the British Electricity Authority. They were carrying out extensive research and development work in welding and had installed an up-to-date X-ray plant. They hoped to be in a position within the next two years to fusion-weld drums capable of standing a pressure of over 1,000lb per sq in.

The British Aluminium Co., Ltd., reports a trading profit for 1949, subject to audit, of £1,463,218, as compared with £1,860,412 for 1948, and a net profit of £442,380 (against £440,749). General reserve receives £125,000 and income tax equalization reserve £84,000. The final ordinary dividend is 6 per cent, again making 10 per cent for the year and the balance carried forward is £388,126 (against £358,952 brought in).

The British Oxygen Co., Ltd., reports a record turnover for the group, but owing to increased costs, the group's earnings for 1949 were £214,310 less than for 1948 at £3,264,022. The trading profit of £2,032,378 compares with £2,403,174 in the previous year, and net profit is £1,006,725 (against £1,307,994), to which is added £150,000 taxation reserves no longer required, making £1,156,725. The profit available to members of the British Oxygen Co. is £1,055,047 (against £1,200,531). General reserve receives £350,000, and the ordinary dividend for the year is maintained at 20 per cent by a final payment of 12 per cent. The balance carried forward is £200,463 (against £196,312 brought in).

Ericsson Telephones, Ltd., held its annual meeting on 31st March when Sir Harold Wernher (chairman), who presided, said that 1949 had been a year of record output and two-thirds of their production was exported. Satisfactory progress had been made by their research laboratories. During the post-war years their most important customer, the British Post Office, had had to restrict its needs for telecommunication equipment to a minimum, but with the slackening of demand from overseas the Government, if it was to maintain its policy of full employment, must give immediate attention to the home market with a view to contracts being placed for buildings and equipment.

Radio & Television Trust, Ltd., reports a consolidated loss for the group for the year to 31st March, 1949, excluding losses on disposal of radio interests and the results of subsidiaries which have since been sold or ceased to be subsidiaries, of £47,039. Losses on disposal of radio interests were £295,220, and the group loss for the year was £244,457, against a profit of £106,574 for 1947-48, to which servicing charges on the preference stocks and sinking fund certificates (£18,079) are added. The holding company carries forward a loss of £283,374, less profits in the remaining subsidiary of £14,697.

A. Reyrolle & Co., Ltd., proposes to pay a final ordinary dividend of 7½ per cent, making 15 per cent for the year (against 12½ per cent). Subject to audit, the net profit for 1949 was £587,207, as compared with £303,381 for 1948.

The Telephone & General Trust, Ltd., reports a group profit for 1949 of £125,531, as compared with £139,927 for the preceding year. The final ordinary dividend is 5 per cent, making 8 per cent for the year (unchanged), and the dividend on the "A" ordinary is maintained at 8 per cent. After placing £37,500 to contingencies reserve the balance carried forward is £100,094 (against £103,505 brought in).

Bakelite, Ltd., reports group profits for 1949 of £200,275, as compared with £247,724 for the preceding year. Taxation absorbs £51,542, and it is proposed to pay a final ordinary dividend of 13 per cent, maintaining the distribution for the year at 18 per cent.

Crompton Parkinson, Ltd., have declared a dividend of 4 per cent on the first preference and 3 per cent on the second preference stocks in respect of the six months ended 31st December last.

Aerialite, Ltd., has declared an interim dividend of 62½ per cent (unchanged).

NEW COMPANIES

Audio-Accoustic Diffuseurs, Ltd.—Registered 11th March. Capital £2,000. Mechanical and electrical engineers, etc. A. Elderfield is the first director. Regd. office: Brook House, Park Lane, W.1.

Auger Accessories, Ltd.—Registered 13th March. Capital £2,500. Manufacturers of and dealers in electrical apparatus, motor vehicles, radio and television receivers, etc. Directors: T. A. Beckett, Mrs. Gladys V. Beckett, and S. Flannery. Regd. office: 67, Cheyne Walk, Grange Park, N.21.

Harris's Electrical Services (Tipton), Ltd.—Registered 18th March. Capital £2,000. Directors: H. Harris and S. Paul. Regd. office: 87, Reddall Hill Road, Old Hill, Staffs.

Electrical Contractors (Coalville), Ltd.—Registered 17th March. Capital £1,000. Solicitors: Crane & Walton, Ashby-de-la-Zouch.

R. H. Ingham & Co. (London), Ltd.—Registered 18th March. Capital £100. Refrigerating and cold storage engineers, electrical engineers and general electrical installation contractors, etc. W. F. Sainter is first and permanent director. Regd. office. 9, Arundel Street, Strand, W.C.2.

Electrodac, Ltd.—Registered 21st March. Capital £2,000. Manufacturers of and dealers in domestic, household and general electrical and other equipment and appliances, etc. Directors: D. A. Crow, Helen C. Crow and C. J. H. Davidson. Regd. office: 19, Great Winchester Street, E.C.2.

LIQUIDATIONS

The Ideal Electrical & General Engineering Co., Ltd.—Winding up voluntarily. Liquidator, Mr. R. Beevers, 49 & 50, Bradford Street, Walsall.

Southern Electrical Accessories, Ltd.—In voluntary liquidation. Meeting 2nd May at 21, Cumberland Place, Southampton, to receive an account of the winding-up by the liquidator, Mr. W. H. Green.

BANKRUPTCIES

J. F. Gannon, carrying on business at 11, Barclay Street, Leeds, electrical engineer.—Receiving order made 27th March on debtor's own petition.

J. W. Watson, 154, Aldborough Road, Seven Kings, Essex, electrical engineer.—Supplemental dividend of 1s 4½d in the £, payable 7th April at 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1.

Motor-car Factory

A NEW 19.5-acre factory which is now nearing completion alongside the existing plant of Vauxhall Motors, Ltd., at Luton, marks the first stage in a £10,000,000 programme of extension and modernization planned for the next three years. These plans provide for the replacement of a considerable part of the present plant with the most modern and efficient production equipment available, the reorganization of all shops for improved production flow, less fatigue and better working conditions for employees, and the provision of specialized tools and jigs, to give greater accuracy and higher output.

This building, which is nearly one-third of a mile long, will increase the area of the Vauxhall factory, at present 2.75 million sq ft, by a third, and is expected eventually to produce an appreciable increase in the present annual output of 84,000 vehicles. The building should be completed by mid-June and production is expected to start in August.

The electricity supply for the building will be independent of the present factory supply. A new primary substation is being built to house a 15 MVA transformer fed from the grid at 33 kV. This will feed four substations with a total output of 9 MVA, built into the factory roof in order to leave the production area unobstructed, and each one includes one or more 750 kVA synchronous condensers for power factor correction. These substations feed a 440 V heavy-current network inside the roof of the building, with a light-current network over the machine lines.

Reproduction of Drawings

Comprehensive notes on the preparation of mechanical drawings which are to be reproduced in printed form were compiled some time ago by Rowlinson-Broughton (industrial publicity consultants), Royal Buildings, 2, Mosley Street, Manchester, 2, for the use of their own staff. They are now making copies of these available to those interested; a limited number only is available.

FINANCIAL SECTION

STOCKS and SHARES

STOCK EXCHANGE markets and prices are remaining steady, though it must be admitted that there is no great volume of business to assist them. On the eve of the Budget, people who hold stocks and shares are unwilling to sell them, in case the Chancellor of the Exchequer should take a favourable view of the outlook and decide to bring about an improvement in prices. On the other hand, people with money to invest decided to keep it in the bank until they hear what the Chancellor's proposals are going to be. The net result is that business in stocks and shares is reduced to something like the minimum. British Government stocks and their satellites hold up remarkably well, British Electricity and British Transport 3 per cents at 93¼ and 88⅛ respectively, have shared in the general advance.

The season of company results and dividends has opened auspiciously for the market in electrical equipment shares. Under the influence of such results as, for instance, English Electric, Ericssons and Reyrolles have produced for 1949, the market remains one of the most firmly supported sections of the Stock Exchange. The "Economic Survey for 1950" did nothing to alter the impression of heavy orders ahead for the chief branches of the industry. With this background, investors are prepared to accept an austere 4¼ to 4¾ per cent on their money from shares of the best established manufacturers.

Shares on Offer

In the electrical equipment market A.E.I. and B.I.C. both show yields of about 4¼ per cent. Shares which pay a little either side of 4¾ per cent include Cromptons, G.E.C., and Siemens. Aberdare Cables have settled down at about 57s 6d ex dividend since the flurry occasioned by the final dividend declaration. They yield a trifle under 7 per cent on the basis of the 20 per cent distribution. C. A. Parsons remain a good market with a rise to 62s 6d, in advance of the 1949 results; on last year's 12½ per cent dividend the return is no more than 4 per cent. A line of Walsall Conduits 4s ordinary on offer at 55s gives £5 1s 9d per cent on the money. Hackbridge & Hewittic 5s shares at 12s 6d pay 5 per cent on the money.

Dividend Limitation

One of the principal matters affecting home investments, to wit, the continuance of the voluntary dividend limitation agreement, seems to be prominent. Meanwhile, market movements suggest that tentative hopes are being built upon the likelihood of its removal, and some companies are expressing dissatisfaction with the principle of the agreement. The chairman of Turner & Newall (which paid a 15 per cent dividend out of 70 per cent earnings) has said that in the absence of legislation they cannot continue beyond this year to relate the dividend rate to anything but earning capacity —with due regard for future provisions. Investment is showing a marked partiality not only for obviously conservative dividends, but also it is harking back to the days when a capital bonus often meant a less than proportionate decrease in the dividend rate.

Reyrolle Results

Anticipation of good results for 1949 from A. Reyrolle was strikingly confirmed by the announcement of a net profit, after tax, of £587,000, and by the increase in the year's dividend from 12½ to 15 per cent. The former rate had been maintained for over thirty years. From the preliminary figures, it appears that profits, before tax, rose by some £625,000. As a result of this increase, the tax-gatherer collects £340,000 more than the £372,000 taken last year. These figures dwarf the increase of about £14,000 net in the ordinary stockholders' portion of £84,000, which, by comparison, has a highly restrained appearance. Mention was made here a fortnight ago of the noticeable strength developed by Reyrolle shares as the dividend date approached. The price put on a further 2s to 65s (cum-dividend of about 9d net) after the news, and provides a yield of £4 12s 4d at the new dividend rate.

Price Changes

A gain of 3 dollars lifted International "Tel. & Tel." to 27. American buying is said to be responsible for a rise to 20s. 6d in Electric and Musical shares. Cossor hardened to 8s, Decca to 12s 3d. Radio & Television are about 7½; the report points the urgent need for reorganization of the capital.

Revo 10s shares at 42s are up a florin on the week. Falk, Stadelmann 37s. 6d, Mather & Platt 48s 9d, Ericsson 43s 9d, and Murex 45s are amongst those that improved at the end of March.

AUTOMATIC SEQUENCE CONTROL

System for Cotton-waste Breaking Machines

A UNIQUE electrical control scheme for the motors driving cotton-waste breaking machines is now in operation in the "devil hole" of Geo. Clegg, Ltd., cotton-waste spinners, Edenfield, Lancs. These are the machines which are used to break up the waste into fine fibre form ready for spinning into yarn.

There are five sets of machines at the mill, each having six consecutive cylinders driven by five 8 h.p. and one 10 h.p. totally enclosed fan-cooled motors made by Crompton Parkinson, Ltd.

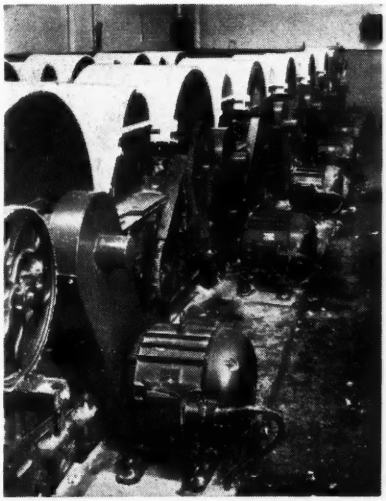
The method of control is to start up each motor separately and in turn to avoid excessive peak current demands which would temporarily overload the mill supply system, trip the main breaker and shut down the mill. At the same time, the motors are controlled so that there is no piling up of material between the cylinders during the starting and stopping of the machines, or in the event of any one motor tripping out on overload.

For each set of machines there is a control panel, manufactured by the Igranic Electric Co., Ltd., which automatically starts up the six motors in a predetermined sequence. This ensures that the delivery-end cylinder is started first, and then each of the other five at about 15-sec intervals until they are all running. Thus there is no possibility of the material piling up between the cylinders.

The intervals between starting are obtained by pneumatic timers, so designed that it is impossible for two starting current peaks to overlap. The motors are directly started by a 3-pole stator contactor, with three magnetic type overloads fitted with time lags. All the operator has to do is to press the push-button mounted on the machine.

If an overload on any one cylinder causes the driving motor to trip out, a sequence interlocking system stops all the preceding motors, and in this way prevents material piling up, but at the same time the other motors continue running. If, for example, the motor driving No. 3 cylinder trips out on overload, Nos. 2 and 1 will also stop, but the remaining motors up to the delivery end continue to operate to clear the machine.

The control equipment for the starting panels is housed in sheet-metal cubicles, with interlocked doors, in a separate compartment situated away from the machines.



One set of cotton-waste breaking machines at Edenfield with six driving motors

Because of the dust and fly in the machine room the motors are of the "Klosd" type, with a fan externally mounted on an extension of the shaft under a cowl which directs the cooling air over the ribbed surface of the frame. The company has found that because this electrical control system is so much more flexible than the old overhead shaft drive there has been a marked increase in production. Crompton Parkinson, Ltd., were responsible for the entire scheme, and also the fluorescent lighting in the works.

Trolley-buses in Darlington

DARLINGTON Council's option to introduce trolley-buses on another three routes in the town expires on 13th June, and it has been decided to apply for a three years' extension. The Corporation's plan to run trolley-buses over a new level crossing on the Fighting Cocks branch railway is being opposed by British Railways and the Corporation has decided to take the necessary steps to protect its interests.

NEXT WEEK'S EVENTS

Wednesday, 12th April

BLACKBURN. — N.W.E.B. Demonstration Theatre, 7 p.m. I.E.E. North Lancashire Sub-Centre. "Electricity in the Cotton Industry," by F. W. Cox and W. E. Swale.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "The Three-phase Induction Motor and its Application," by G. Briggs.

BRIGHTON.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "The Continental Development of Single-Anode Mercury-Arc-Rectifier Valves for High Power," by H. von Bertele.

COVENTRY.—Technical College, The Butts, 7 p.m. A.S.E.E. Coventry Branch. "Electrical Installations," by J. Flood.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. Scottish Centre. Discussion on "Some Experiments in Pulse Methods of Fault Location on Overhead Lines," opened by D. W. Berry.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "A Review of some Television Pick-up Tubes," by Dr. J. D. McGee, and "The Design of a Television Camera Channel for use with the C.P.S. Emitron," by Dr. E. L. C. White and M. G. Harker.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Institution of Heating & Ventilating Engineers. "Some Aspects of Air Conditioning in the Tropics," by Dr. J. J. O'Dwyer.

SWANSEA.—The Y.M.C.A., 6 p.m. I.E.S. Swansea Group. "Lighting of Steelworks," by J. D. Callaway.

Thursday, 13th April

CARDIFF.—South Wales Electricity Board Demonstration Theatre, The Hayes, 5.45 p.m. I.E.S. Cardiff Centre. "Lighting of Steelworks," by J. D. Callaway.

At the South Wales Institute of Engineers, Park Place, 6 p.m. Association of Mining Electrical & Mechanical Engineers, South Wales Branch. "Civil Engineering in and about Collieries," by J. Pettit.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. Discussion on "B.S.I. Specifications in relation to Electrical Accessories for Domestic & Industrial Applications," opened by J. F. Stanley.

At the Institute of Marine Engineers, 85-88, The Minories, E.C.3, 6.30 p.m. Institute of Welding, South London Branch. Annual general meeting. "Inspection & Weldability Tests," by T. L. H. Butterfield.

MANCHESTER.—College of Technology, 6 p.m. I.E.S. Manchester Centre. "Maintenance of Fluorescent Lamps & Auxiliary Gear," by W. A. R. Stoyle.

Engineers' Club, Albert Square, 6.30 p.m. E.P.E.A. Northern Meter & Instruments (Technical) Group. Annual general meeting. "A Simple Outline of the Factors Influencing the Stable Operation of an Electrical Power System," by A. H. Grey and D. R. Fenwick.

SWANSEA.—Plaza Cinema, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "The Performance of the British Grid System in Thunderstorms," by Dr. J. S. Forrest.

Friday, 14th April

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. I.E.S. (Birmingham Centre). "Interior Decoration and its Influence on Illumination," by S. A. Wood.

BRADFORD.—Y.E.B. Offices, 45-53, Sunbridge Road, 7.30 p.m. I.E.S. Bradford Group. "Electric Lamps, Yesterday, To-day and To-morrow," by A. L. Randall.

HULL. — Y.E.B. Showrooms, Ferensway, 7.30 p.m. Hull Electronic Engineering Society. "Electronic Servo-Control for Industry," by S. H. Dale.

LONDON.—39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. "The Induction Motor, with particular reference to Single-phase Machines and some account of their Development," by R. J. Herbert.

May Fair Hotel, W.1. Institution of Chemical Engineers. Annual meeting and annual dinner.

NEWCASTLE-ON-TYNE.—King's College, 7 p.m. I.E.E. North Eastern Students' Section. "Calculating Machines," by C. G. Hopper.

Saturday, 15th April

HULL.—Y.E.B. Offices, Ferensway, 2.30 p.m. I.E.E. North Midland Students' Section. "Surge Phenomena in Power Engineering," by A. N. Greenwood.

Cooling Towers

A CONTRIBUTION to the theory of natural draught towers for cooling the condenser water of power stations has been made by Messrs. B. Wood and P. Betts (Merz and McLellan) in the paper they prepared for the Steam Group of the Institution of Mechanical Engineers.

The authors have extended the theory to allow for varying air rates; established relevant equations and shown how they can be solved. Derivation of the basic characteristics of a particular tower and its "fill" from the analysis of test data permits the performance to be predicted of a similar tower under other conditions. A basis has been provided for the formation of logical ideas about the ways in which various factors influence performance, although the authors' analysis may be too involved for routine design work.

An explanation which seems to account for the observed effect of wind on increase of draught is offered in the paper, which also discusses the physical principles of water loss by evaporation and carry-over, the formation of visible plume and avoidance of nuisance.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

3900. Metalastik, Ltd., and Roy, P.S.—Electric circuit-breakers and contacts therefor. 29th December, 1945. (637641.)

8896. Standard Telephones & Cables, Ltd.—Radio detection and direction finding with pulse signals. 5th May, 1944. (637642.)

1945

883. Submarine Signal Co.—Electro-acoustic transducer. 10th January, 1945. (637501.)

8889. Ehlinger, M.—Automatic feed regulator for boilers. 10th April, 1945. (637502.)

21557. British Thomson-Houston Co., Ltd.—Washing machines. 23th August, 1945. (637503.)

25233. Sueur, R., and Marzin, P.—Multi-channel carrier-wave transmission systems. 28th September, 1945. (637712.)

26861. Hope, V.—Fuse carriers and contacts therefor. 15th October, 1945. (637782.)

32174. British Thomson-Houston Co., Ltd.,—Power factor correction arrangements for intermittently energized inductive electric loads. 28th November, 1945. (Addition to 543800.) (637644.)

1946

549. Currah, L. E.—D.c.-a.c. or frequency conversion circuits. 10th May, 1947. (637783.)

588. Compagnie Générale d'Electricité.—Method of and means for making multi-strand conductors. 7th January, 1946. (637571.)

12393. British Thomson-Houston Co., Ltd.—Screw-down control systems for rolling mills. 24th April, 1946. (637785.)

13785. Telephone Manufacturing Co., Ltd., Pyatt, E. C., and King, K. C. A.—Devices for transmitting a sequence of telegraphic or like impulses particularly for testing purposes. 7th May, 1946. (637716.)

16227. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Circuit arrangements adapted for the supply of electric oscillations to a load. 28th May, 1946. (637507.)

22058. Telephone Manufacturing Co., Ltd., Pyatt, E. C., and King, K. C. A.—Electrical testing and indicating systems. 22nd July, 1947. (637722.)

25924. Ferrand, L.—Fused salt electrolytic cells. 29th August, 1946. (637579.)

25970. Standard Telephones & Cables, Ltd.—Telecommunication systems employing differently polarized electromagnetic waves. 29th August, 1946. (Addition to 618615.) (637580.)

27580. Carnegie-Illinois Steel Corporation.—Electric control for the plating current of electro-plating apparatus. 13th September, 1946. (637581.)

28582. Lazerenko, B. R., and Lazerenko, N. J.—Method of working metals and other electro-conductive materials and means for applying same. 24th September, 1946. (637793.)

31655. Roberts, E. G. L.—Manufacture of metal-clad insulated conductors. 9th October, 1947. (637647.)

35317. Withers, D. F.—Electric circuit fuses. 13th April, 1949. (637649.)

36328. Telephone Manufacturing Co., Ltd., Pyatt, E. C., and King, K. C. A.—Electric impulse generating systems. 28th November, 1947. (Addition to 637716.) (637727.)

1947

319. Radio Corporation of America—Colour television. 3rd January, 1947. (637799.)

2972. Wiseman & Co., Ltd., A., Arthur, A. J., and Bourne, D. R.—Electrical collectors of the slipper type for feeding electric traction vehicles. 2nd February, 1948. (637730.)

4679. Harmer, H. M.—Regulating arrangements for electrical circuits. 18th March, 1948. (637518.)

5130. Standard Telephones & Cables, Ltd.—Full wave rectifier in a glass or other insulating container. 21st February, 1947. (637519.)

5137. Western Electric Co., Inc.—Telephone systems. 21st February, 1947. (637731.)

8559. Cole, Ltd., E. K., and Hutchings, E. L.—Moving-coil loudspeakers. 25th March, 1948. (637590.)

9531. Goodmans Industries, Ltd., and Chapman, C. T.—Loudspeakers or microphones. 10th May, 1948. (637735.)

10007. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Method of forming blocking layers for blocking-layer cells. 15th April, 1947. (637736.)

13236. England, T. S., and Carruthers. R.—Pulse generators. 28th May, 1948. (637813.)

15889. Automatic Telephone & Electric Co., Ltd., and Davison, A.—Mounting arrangements for electrical components. 23rd October, 1947. (637596.)

16883. Harmer, H. M.—Regulation of current supplied from an a.c. source. 26th July, 1948. (637663.)

16884. Harmer, H. M.—Electrical regulating arrangements. 26th July, 1948. (637664.)

17643. Stillwell, P. F. T. C.—Circuit arrangements for producing control signals dependent upon the frequency difference between electrical oscillations. 5th July, 1948. (637597.)

21074. Sylvania Electric Products, Inc.—Coating of electric-discharge lamps with luminescent material. 1st August, 1947. (637539.)

21693. Sylvania Electric Products, Inc.—Incandescent electric lamp. 7th August, 1947. (637541.)

22128.—Sperry Gyroscope Co., Inc.—Speed-regulating arrangements for electric motors. 8th August, 1947. (637544.)

23770. Kent, N. H.—Gas turbine power plant installations. 25th August, 1946. (637598.)

24262. Cole, Ltd., E. K., and Burnard, C. L.—Tone control arrangements for audio frequency amplifiers. 3rd September, 1948. (637549.)

24291. Horstmann, F. G. Q., and Hadrill, G. T. C.—Mounting, more particularly for electric table lamps. 16th October, 1947. (637550.)

24312. Western Electric Co., Inc.—Electrical switches employing piezo-electric elements. 3rd September, 1947. (637823.)

24884. British Thomson-Houston Co., Ltd., and Maggs, A. H.—Dynamo-electric machines. 24th April, 1948. (637825.)

25831. National Broach & Machine Co.—Laminated electric rotors and a method of finishing the outer cylindrical surfaces thereof. 23rd September, 1947. (637554.)

26072. Télémécanique Electrique.—Mounting of components of electrical equipment on supports. 25th September, 1947. (637749.)

26926. General Electric Co., Ltd., Penrose, J. R., and Donelan, J. A.—Processes for electric arc seam-welding and apparatus therefor. 7th October, 1948. (637826.)

28878. Kotik, J.—Electric stoves. 29th October, 1947. (637828.)

31254. Ferranti, Ltd., and Capper, J. F.—Machines for welding thermoplastic materials. 26th November, 1948. (637603.)

31706. General Electric Co., Ltd., and Bowtell, J. N.—Apparatus for operating electric flash discharge lamps for use for example in photography. 1st December, 1948. (637688.)

32405. Parsons, Ltd., C. H., and Handley, G. B.—Electric lever-operated switches for alternating-current circuits. 9th December, 1948. (637837.)

32462. Metropolitan-Vickers Electrical Co., Ltd., and Carpenter, S. W.—Butt-welding of tubular metal parts. 8th December, 1948. (637838.)

33316. British Thomson-Houston Co., Ltd.—Air supply means for aircraft cabins. 17th December, 1947. (637689.)

33379. Revo Electric Co., Ltd., and Felton, A. E.—Hinging of doors, windows and the like. 15th December, 1948. (637608.)

33649. Hazeltine Corporation.—Electric impedance networks. 19th December, 1947. (637609.)

34417. Hoover, Ltd.—Electric toasters. 29th December, 1947. (Cognate application 34418, 31st December, 1946.) (637610.)

1948

770. Hoover, Ltd.—Electric toasters. 9th January, 1948. (637612.)

1395. Western Electric Co., Inc.—Signalling systems for the transmission of complete waveforms by means of code groups of pulses. 16th January, 1948. (637848.)

1765. Beebe, N. S. (Best, N. M.).—Electric plug-and-socket connection. 20th January, 1949. (637613.)

1891. Rose, D.—Devices for preventing knotting or twisting of electrical flex. 18th November, 1948. (637696.)

3086. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Circuit arrangements for electric-discharge lamps. 3rd February, 1949. (637762.)

4102. Forges et Ateliers de Constructions Electriques de Jeumont.—Series-parallel control systems for electric motors. 12th February, 1948. (637700.)

4755. Guardian Electric Manufacturing Co.—Electromagnetic relay. 18th February, 1948. (637616.)

5053. Guardian Electric Manufacturing Co.—Electromagnetic relay. 20th February, 1948. (637617.)

5402. Forges et Ateliers de Constructions Electriques de Jeumont.—Series-parallel control systems for electric motors. 24th February, 1948. (637703.)

5596. Guardian Electric Manufacturing Co.—Sockets for electrical plug-in devices. 25th February, 1948. (637705.)

5748. Rotax, Ltd., and Bourne, W. G.—Automatic electric switches. 17th February, 1949. (637618.)

7642. British Mechanical Productions, Ltd., and Deakin, S. T.—Electrical socket contact elements. 4th March, 1949. (637625.)

8935. Fuke, F. C.—Electric switches particularly tumbler and micro-break type switches. 15th March, 1949. (637628.)

8995. Bouly, H. G. (Harnischfeger Corporation).—Apparatus for producing an electric arc welding alternating-current. 30th March, 1948. (637765.)

10141. Rosenfeld, M.—Stepless regulating transformers. 11th April, 1949. (637634.)

11544. British Thomson-Houston Co., Ltd., and Carfrae, W. J.—Measuring power available from a.c. generators. 27th April, 1948. (637709.)

12725. Thessco Industrial Research, Ltd., and Briggs, J. C.—Electrical contacts. 9th June, 1948. (637568.)

14795. Westinghouse Electric International Co.—Elastic-fluid turbines. 1st June, 1948. (637771.)

14851. Millington, H.—Electric socket connector fittings. 2nd June, 1948. (637772.)

31622. Pye, Ltd., and Pannell, W. M.—Stranded conductors for radio inductors. 26th November, 1948. (637560.)

Amended Specifications

611515. Aktiebolaget Kanthal.—Heat-resisting machinable alloy for use as electric resistance material for high temperatures as well as for manufacturing details of construction exposed to high temperatures.

622472. Diprose, K. V.—Photo-electric follower apparatus.

PUBLIC LIGHTING NOTES

A REPORT by the borough engineer of MIDDLESBROUGH (Mr. J. A. Kenyon) on the proposed change-over of street lighting from gas to electricity has not been approved by the Town Council. The question of using electricity on main roads other than those in shopping areas and the type of lamp to be used in shopping areas has been referred to a sub-committee. The programme of street lighting for 1950-51 is to be confined to lighting on new estates with isolated additional lighting, at a cost of £8,300. The borough engineer's report estimated that the cost of the work spread over about 15 years would be £310,200. This included £110,000 for traffic route conversions, £69,000 for new housing roads, £11,200 for isolated additions, and £120,000 for minor road conversions. At present there are over 25 miles of main road lighting, nearly all by gas.

The Middlesbrough Council is in touch with the North Eastern Electricity Board regarding new terms for electric street lighting which provide for an immediate increase of 7 per cent in energy charges rising to 14 per cent in five years. Maintenance costs are increased by 7 per cent.

On the recommendation of the North Eastern Electricity Board, the SKELTON (YORKS) Urban District Council is to overhaul the street lighting system. The Board has stated that of 739 lighting units 518 should be either repaired or renewed, the cost being estimated at £3,289. The Council has decided to spread the cost over ten years.

BAMBURGH (NORTHUMBERLAND) Parish Council is to carry out a street lighting scheme. The North Eastern Electricity Board has estimated that the cost of providing 18 street lamps would be £587. Maintenance costs will be £46 per annum.

EXPORT INQUIRIES

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Pakistan.—Firm in Karachi wishes to obtain the sole representation in Pakistan of makers of wires and cables (X.208).

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—12th May. City Council. Maximum demand indicators. (C.R.E. (I.B.) 47943/50. Ten/1126.)* 4,320 polyphase a.c. motors. (C.R.E. (I.B.) 47990/50. Ten/1124.)* 9th June. 33 kV underground and submarine cable, multi-core underground and submarine pilot cable. (C.R.E. (I.B.) 47945/50. Ten/1123.)*

Carlisle.—City Council. Electrical installations in 40 flats. L. J. A. Stow, city engineer, 18, Fisher Street, Carlisle.

Cockermouth.—Urban District Council. Electrical wiring of 77 houses, Moor and Kirkbank estates. M. M. Dixon, surveyor, Town Hall.

Denbighshire.—Education Authority. Heating and electrical installation at new primary school at Wrexham. (See 31st March issue.)

Durham.—County Education Committee. Electrical installation at Sacriston County School. County architect, County Hall, Durham.

Edinburgh.—1st May. North of Scotland Hydro-Electric Board. 11 kV and lower voltage distribution lines. (See 31st March issue.)

Hartlepool.—Town Council. Installation of electric lighting in 29 houses at West View. R. H. Snowball, borough engineer

Manchester.—15th April. College of Technology Sub-Committee. Electrical equipment for the College of Technology. (See this issue.)

Margate.—17th April. Corporation. Installation of decorative lighting scheme and supply of 10,000 strip lighting lamps. (See this issue.)

Reigate.—28th April. Corporation. Electrical rewiring of Town Hall. (See this issue.)

Seaton Valley (Northumberland).—Urban District Council. Electrical goods for 34 houses, Blyth Street estate. T. W. Burgess, surveyor.

Smethwick.—Corporation. Electrical installations in houses on Old Chapel estate. Borough engineer.

Uruguay.—MONTEVIDEO.—2nd May. Administracion General de las Usinas Electricas y Telefonos del Estado. Supply of 1,750 wall telephones and 3,400 desk telephones. (C.R.E. (I.B.) 47905/50.)*

ORDERS PLACED

Bath.—Corporation. Recommended. Electrical installation work (phase 2) at Moorlands Junior School (£2,203).—Central Electric.

Durham.—County Education Committee. Electrical installation at Jarrow Grammar School (£3,200). G. F. Ellis & Co., Gateshead.

Maidstone. — Corporation. Recommended. Wiring 86 houses on Shepway estate (£2,270).—Charles Walter, Ltd.

Warrington. — Corporation. 5-ton Tilling-Stevens battery electric vehicle (£1,924).—Leach & Seed (1946), Ltd. Heating installation in Museum storeroom (£124).—Charters Electrical Co.

West Hartlepool.—Town Council. Electrical installations in 88 houses on the Rift House estate.—Illuminated Installations, Ltd.

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alfreton.—Houses (64), Firs Farm estate; U.D.C. surveyor.

Bath.—Operating theatre block at Royal United Hospital, Combe Park; A. J. Taylor & Partners, architects, 4-5, Bridge Street.

Birmingham.—Two sub-divisional police stations, Quinton Road West and Sheldon Heath Road; city engineer.

Bromley.—Flats (40) and maisonettes (36), Blyth Road; Dalgleish & Pullen, architects, 17, Fitzhardinge Street, W.1.

Bromsgrove.—Houses (100), Charford; U.D.C. surveyor.

Burton-on-Trent.—Engineering factory, Wellington Street; E. Phillips, architect, 10, Premier Road, Nottingham.

Cardiff.—Operating theatre block at St. David's Hospital; Welsh Regional Hospital Board, Cathays Park.

Carshalton.—Flats (84), Lyndhurst Avenue; U.D.C. surveyor.

Crawley.—Houses (133) for Crawley Development Corporation; Rice & Son, Ltd., builders, 3, Palace Place, Brighton.

Crewe.—Community centre and library, Middlewich Street; borough engineer.

Croydon.—Houses (245), New Addington estate (eastern section); borough engineer.

Primary school, Normanton Road (£51,893); Scherrer & Hicks, architects, 50, George Street.

Darwen.—Houses (300), Birch Hall site; borough surveyor.

Douglas (I.o.M.).—Houses (134), Willaston estate; B. McCormick Davies, Ltd., Spring Valley, Douglas.

Edinburgh.—Factory; Moir & Baxter, Ltd., motor engineers, Comeley Bank, Edinburgh, 4.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Garstang.—Houses (138), Kepple Lane; R.D.C. surveyor.

Grimsby.—Houses (56), Immingham, for R.D.C.; J. F. Pye, architect, 11, New Street.

Halifax.—Houses (62), Illingworth South; borough engineer.

Hereford.—Three pumping stations at the sewage disposal works; city surveyor.

County ambulance station, Lichfield Avenue; county architect.

Hinckley.—Proposed extensions to the Sketchley Hill estate (108 houses) and additional houses at Barwell and Earl Shilton; U.D.C. surveyor.

Houghton-le-Spring.—Houses (146), Newbottle for the U.D.C.; V. J. Hunter, surveyor.

Huntingdon.—Houses (31), American Lane; T. F. Marriott, Ramsey, Hunts.

Isle of Man.—Houses (134) Willaston; McCormick & Davies, Ltd., Spring Valley, Douglas. I.o.M.

Lancashire.—Old peoples' hostel at Middleton; county architect, Preston.

London.—CATFORD.—Block of 30 flats, Bromley Road, for Lewisham B.C.; Wates, Ltd., builders, 1258, London Road, S.W.16.

HAMMERSMITH.—Flats (96), Blythe Road; borough engineer.

KENSINGTON.—Flats, Ilbert Street; Artisans & General Dwellings Co., Ltd., 1, Cromwell Road, S.W.7.

Lowestoft.—Houses (72), Kirkley Run; borough surveyor.

Manchester.—Extensions at University; J. W. Beaumont & Sons, architects, 53, Spring Gardens.

Melton Mowbray.—Houses (41), Asfordby Road, for U.D.C.; W. H. Jarvis, architect, Egerton Lodge.

Millom.—Houses (44) for R.D.C.; S. Sheldon & Son.

Morecambe.—Technical college; G. Noel Hill, county architect, Preston.

Oswestry.—Extension of nurses' home at Robert Jones and Agnes Hunt Orthopædic Hospital (£63,000); Birmingham Regional Hospital Board.

Plymouth.—Dwellings (103), Whitleigh estate; city architect.

Reading.—Houses (176), Park Farm estate; borough architect.

Works additions; Thomas & Evans, Ltd., St. George's Road.

Rochdale.—Extensions to Mellor Street workshops (£25,000); borough engineer.

Rugby.—First stage of Dunsmore secondary school; Foster & Dicksee, Ltd., James Street.

Scarborough.—Church hall, Auborough Street; Alderson and Allen, architects, 32, St. Nicholas Street, Newcastle-on-Tyne.

Houses (50), Eastfield; borough engineer.

Scunthorpe.—Police buildings and magistrates' courts for Lindsey C.C.; C. B. Pearson & Son, architects, 18, Dalton Square, Lancaster.

Sedgefield.—Houses (24), Kensington Gardens, Ferryhill, for the R.D.C.; J. C. Watson, Ltd., builders, Stockton.

Skelmersdale.—Houses (38), Windrows Farm site, for U.D.C.; J. Gee, Skelmersdale.

Smethwick.—Regional neuro-surgical centre at Isolation Hospital; Birmingham Regional Hospital Board, 10, Augustus Road, Birmingham.

Southampton.—Flats (96), Kingsland area; borough architect.

Stamford (Lincs).—Extensions to out-patients' department at hospital; F. J. Lenton & Partners, architects, Broad Street.

Stockport.—Secondary school; Cruikshank & Seward, architects, 16, Princess Street, Manchester.

Swansea.—Fire station (first section £51,225) for T.C.; borough architect.

Thornaby-on-Tees.—Houses (44), Lanehouse Road; borough engineer.

Wallasey.—Extensions to Eastway primary school; Quiggin & Gee, architects, Harley Buildings, Old Hall Street, Liverpool.

Wallsend.—Houses (52), Low Willington; J. H. James, builder, Archer Street.

Additions to baths (£35,000); P. L. Browne, Son and Harding, architects, Pearl Buildings, Northumberland Street, Newcastle-on-Tyne.

Warrington.—Extensions to paper works; A. Chadwick, H. Fairclough, Ltd., Howley.

Washington (Co. Durham).—Houses (44), Blue House estate, for U.D.C.; direct labour.

Weymouth.—Assembly hall and practical rooms wing at Broadway secondary modern school, Dorchester Road; county architect, County Hall, Dorchester.

Whitburn (Co. Durham).—R.C. church; Thomas Curry and Son, builders, Meldon Street, Newcastle-on-Tyne.

Wirksworth.—Dwellings (23), Middleton site, for U.D.C.; G. Shipman & Sons, Ltd., Chesterfield.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 29th March.

NOVAGLOW. No. B682,317. Class 9. Electrically illuminated signs.—J. A. Macharg & J. Macharg (Junior) trading as Nova Sign Co., 2, Saville Place, Newcastle-on-Tyne,1.

PRENTO. No. 683,178. Class 9. Electrical apparatus and parts thereof, all included in Class 9.—Prentice, Ltd., Progress Works, Gelderd Road, Leeds, 12.

UNCLE HOLLY. No. 683,832. Class 9. Electrical apparatus and instruments included in Class 9; and wireless, photographic and cinematographic apparatus and instruments; and parts of all the said goods included in Class 9.—Selfridges, Ltd., 400, Oxford Street, London, W.1.

FESTIVAL. No. 684,584. Class 9. Electrical apparatus and instruments included in Class 9; and radio receiving sets (complete) and scientific and nautical apparatus and instruments.— E. K. Cole, Ltd., Ekco Works, Priory Crescent, Southend-on-Sea, Essex.

PREFECT. No. 685,324. Class 9. Wireless and television aerials and masts and supports therefor included in Class 9.—A. Kennedy and R. Owen, trading as Kennedy & Owen, 9, Earlsdon Street, Coventry.